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TANKS!

BATTLEFIELD MONSTERS OF WORLD WAR II

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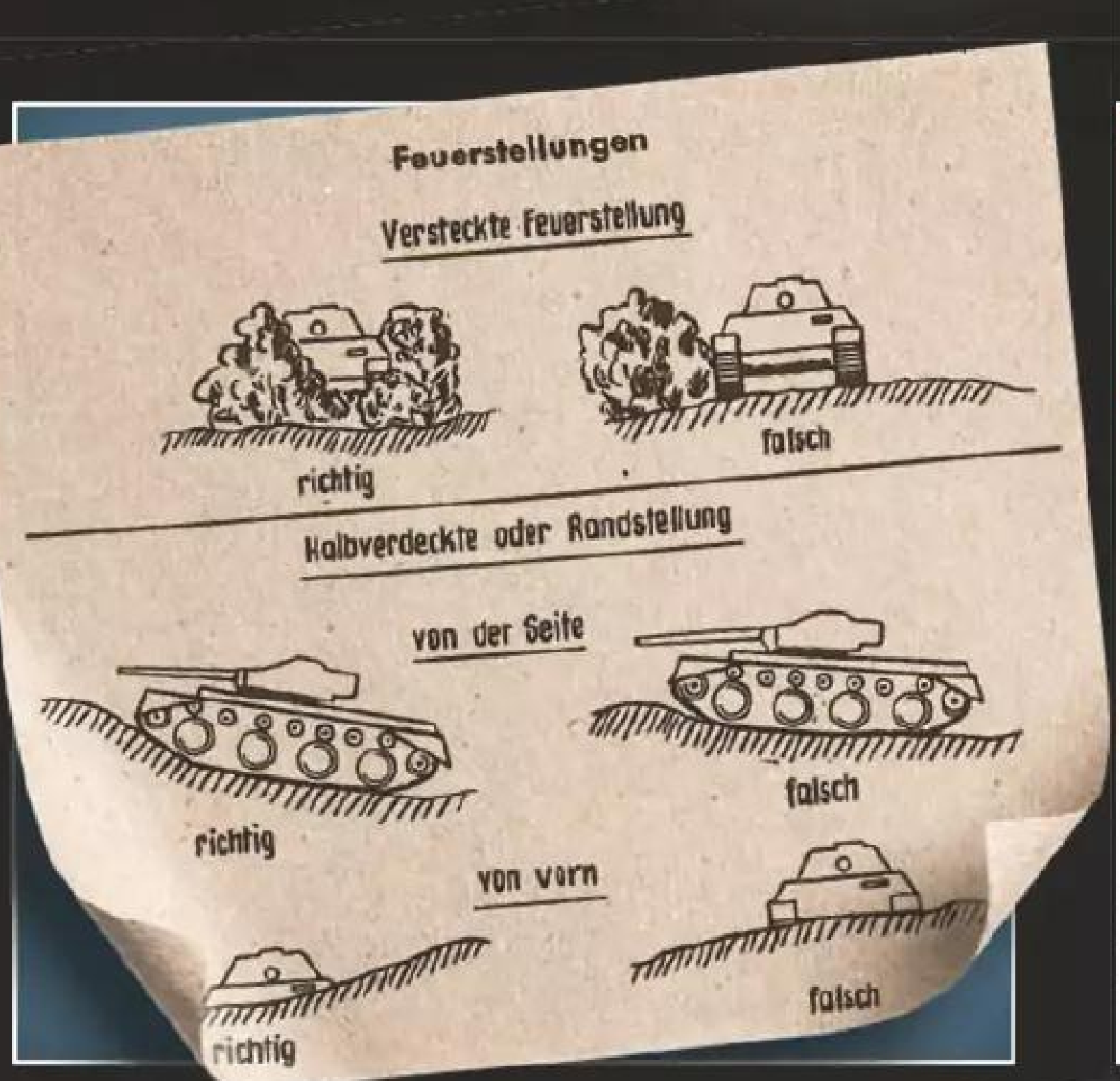
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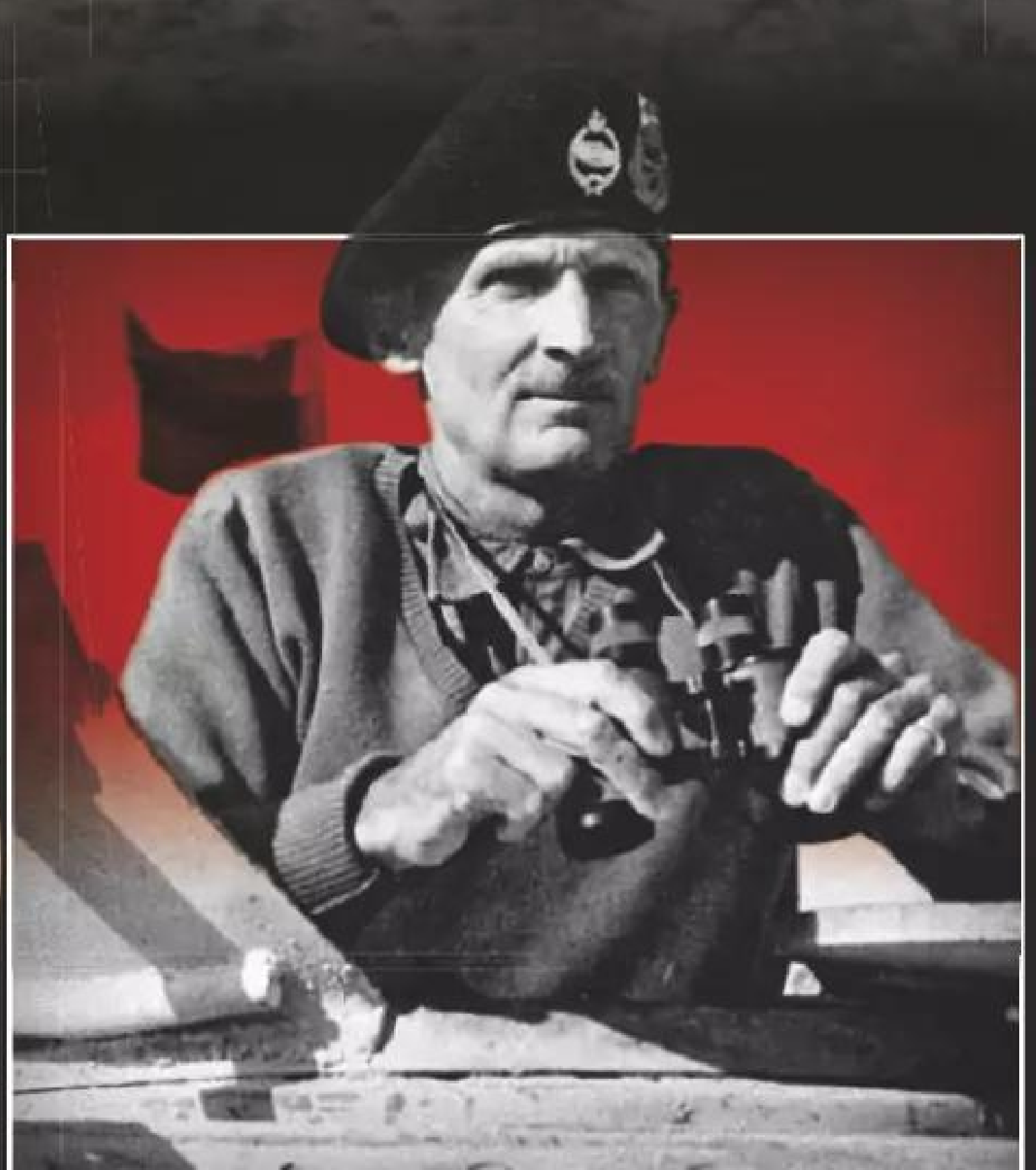
Manual: Simple drawings provided tactics on the battlefield



Montgomery: Novice general defeated Rommel at El Alamein

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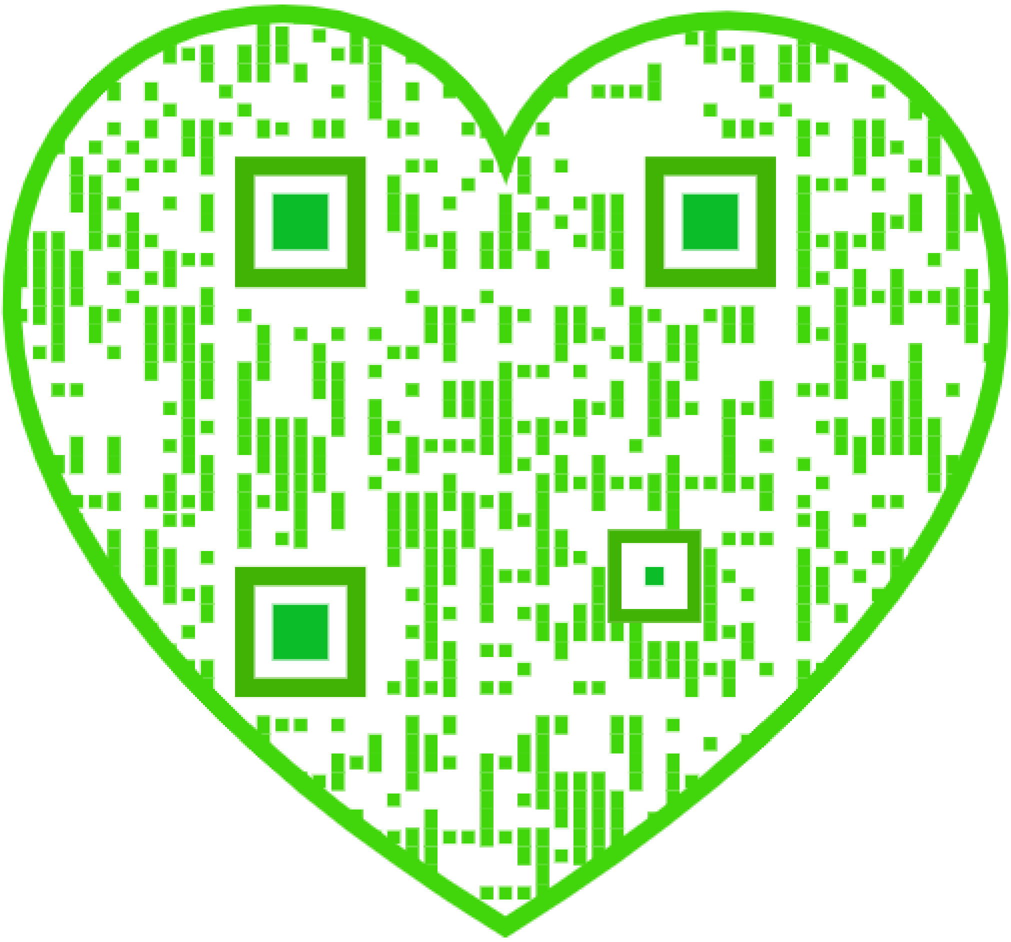

BATTLEFIELD TITANS

Tanks evolved rapidly during World War II. Armour was thickened, firepower strengthened and tactics changed as new opportunities presented themselves. Inside the mechanised titans, crews of up to five men were assigned specific roles, and each man's life depending on the vigilance and proficiency of his crewmates. In open country tanks were vulnerable, but by exploiting the landscape, tank drivers were able to find positions to fully exploit their lethal capabilities. Skilled tank commanders achieved the same hero status as fighter pilots. Meet the tank aces and follow their dramatic skirmishes on the battlefield in this special issue of *Bringing History to Life*.

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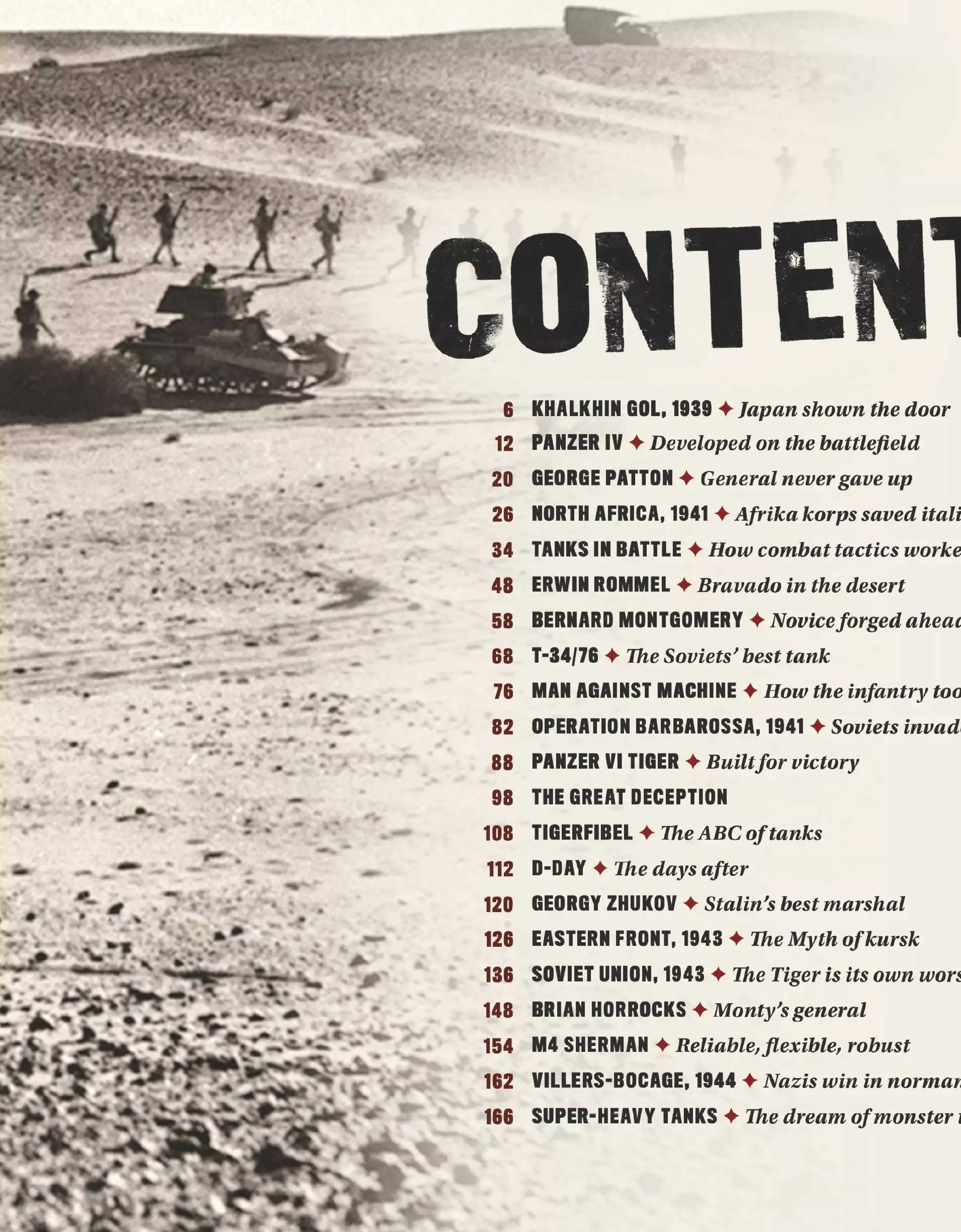


CONTENT

6 **KHALKHIN GOL, 1939** ✦ *Japan shown the door*

12 **PANZER IV** ✦ *Developed on the battlefield*

20 **GEORGE PATTON** ✦ *General never gave up*

26 **NORTH AFRICA, 1941** ✦ *Afrika korps saved italians*

34 **TANKS IN BATTLE** ✦ *How combat tactics worked*

48 **ERWIN ROMMEL** ✦ *Bravado in the desert*

58 **BERNARD MONTGOMERY** ✦ *Novice forged ahead on the battlefield*

68 **T-34/76** ✦ *The Soviets' best tank*

76 **MAN AGAINST MACHINE** ✦ *How the infantry took on tanks*

82 **OPERATION BARBAROSSA, 1941** ✦ *Soviets invaded*

88 **PANZER VI TIGER** ✦ *Built for victory*

98 **THE GREAT DECEPTION**

108 **TIGERFIBEL** ✦ *The ABC of tanks*

112 **D-DAY** ✦ *The days after*

120 **GEORGY ZHUKOV** ✦ *Stalin's best marshal*

126 **EASTERN FRONT, 1943** ✦ *The Myth of kursk*

136 **SOVIET UNION, 1943** ✦ *The Tiger is its own worst enemy*

148 **BRIAN HORROCKS** ✦ *Monty's general*

154 **M4 SHERMAN** ✦ *Reliable, flexible, robust*

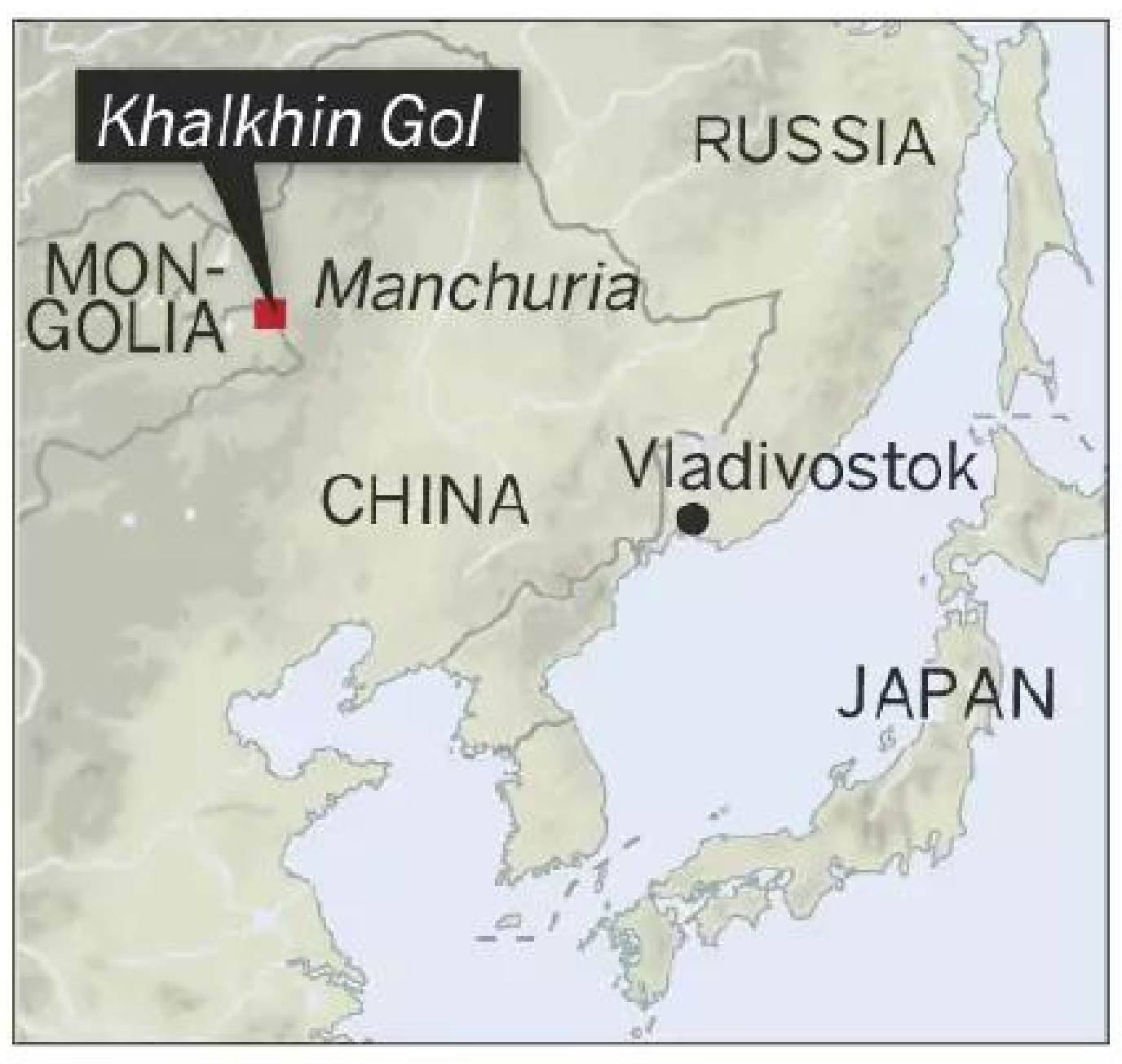
162 **VILLERS-BOCAGE, 1944** ✦ *Nazis win in normandy*

166 **SUPER-HEAVY TANKS** ✦ *The dream of monster tanks*

JAPAN SHOWN

Summer 1939 and the Red Army breaks Japan's 6th Army in border battles at Mongolia. Japan abandons plans to take Siberia, and the Soviets avoid a devastating war on two fronts. It would play a crucial role in determining the war.

Text: **LENNART SAMUELSON**



The battle took place in today's Mongolia by the river Khalkhin Gol.

From May to September 1939 intensive fighting broke out in the border region between Manchuria and Mongolia. This summer war between Japanese and Soviet-Mongolian troops at the river Khalkhin Gol went largely unnoticed in the wider world, despite the fact it would be crucial for how the forthcoming world war would develop. The battles were overshadowed by increasing tensions in Europe. The Soviet Union was active in securing its interests; while fighting border disputes in the Far East, they negotiated on the one hand with France and Great Britain on an agreement to defend Poland against expected German aggression, while simultaneously negotiating – and signing – a non-aggression pact with Germany.

When Japan invaded Manchuria from its colony Korea in 1931, it was considered a matter of great urgency by Stalin and the Red Army leadership. It was a known fact that discussions had been going on in Tokyo about attacking eastern parts of Siberia to meet the country's long-term needs for various natural resources. When the Japanese reformed Manchuria as Manchukuo, Moscow abruptly changed its ongoing five-year plan to invest more in the war industry. To provide a deterrent, the Red Army demonstratively moved a number of bombers to the area around Vladivostok. From this position they could reach Japan. The military areas in the Far East were reinforced through infrastructure (rail, roads and harbours) and forts. The Soviet government also bolstered its agent network in China to keep well-informed of Japanese military developments.

On the other hand, increased fear of Japanese spies in local Soviet populations in the easternmost

The Battle of Khalkhin Gol in the summer of 1939 developed into one of the first major tank battles. The picture shows fast Soviet BT-7 tanks.

THE DOOR

regions of the country led to Stalin's decision in 1937 to deport around 170,000 Soviet Koreans from the coastal areas of the Sea of Japan to uninhabited areas in Kazakhstan.

Small skirmishes occurred frequently along the border between Manchuria and the Soviet Union. The borders had been established through an agreement in the mid-1800s, but were still controversial in many places. In some situations, Soviet authorities withdrew or found diplomatic compromises after pressure from Japan. But in other cases they repelled any Japanese advances.

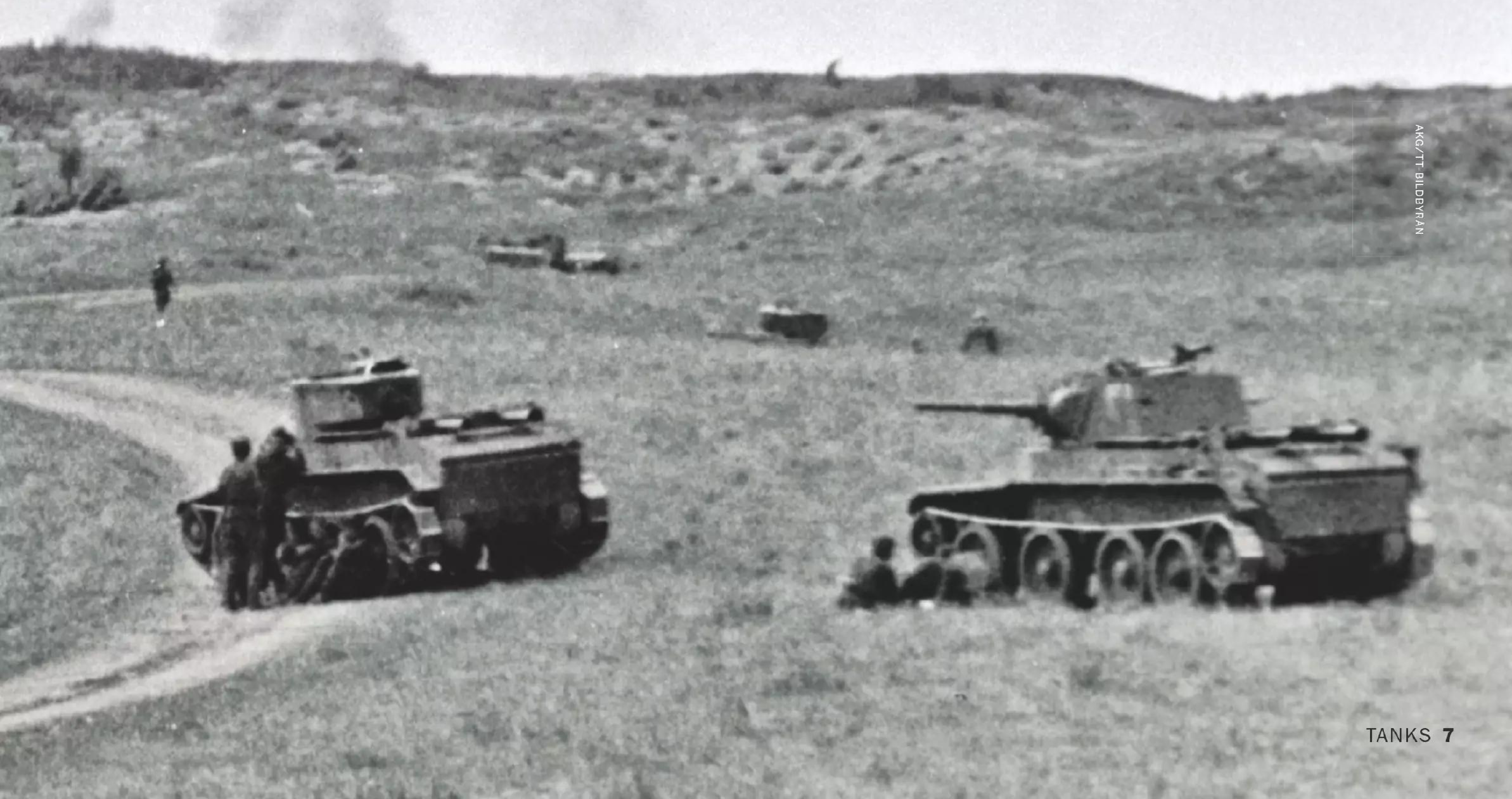
There were also areas in dispute at the border between Mongolia and Manchuria. One notable example was the area around the Khalkhin Gol river. Japan claimed that the border was the river itself, while the Soviets claimed the area east of the river to the village of Nomonhan. On 11th May, 1939, skirmishes broke out between Mongolian and Manchurian border patrols at Nomonhan, which led to reinforcements being brought in from both sides.

The Soviet-Mongolian troops were forced to withdraw from their positions east of the river. Two days later, reinforced Mongolian forces appeared and reoccupied the area. The leadership of the Japanese Kwantung Army used this pretext to enter the Soviet-controlled area. On 14th May, two Japanese regiments pushed the Mongolian units back and reached the river. But the next time it came to a fight, Soviet-Mongolian troops successfully surrounded the Japanese, who suffered heavy losses until 28th May. Then both parties assembled large military units. Soon the Japanese had 30,000 men in Mongolia.

When Moscow received contradictory reports on the border conflict, it decided to send an officer to collect the facts and prepare a counterattack against Japanese troops. The job was handed to Georgy Zhukov. This distinguished officer had begun his military career during World War I and the Russian Civil War – by the 1930s he'd advanced to deputy commander of the Belorussian Military District (see page 76).

The Soviet military leadership feared that Japan's attack was a prelude for a full-scale invasion of Mongolia, which would then lead to a strike on the Soviet Union in the area around the Bay of ►

"SOVIET MILITARY LEADERSHIP FEARED THAT JAPAN'S ATTACK WAS A PRELUDE FOR A FULL-SCALE INVASION"


AKG/TT BILDBYRAN

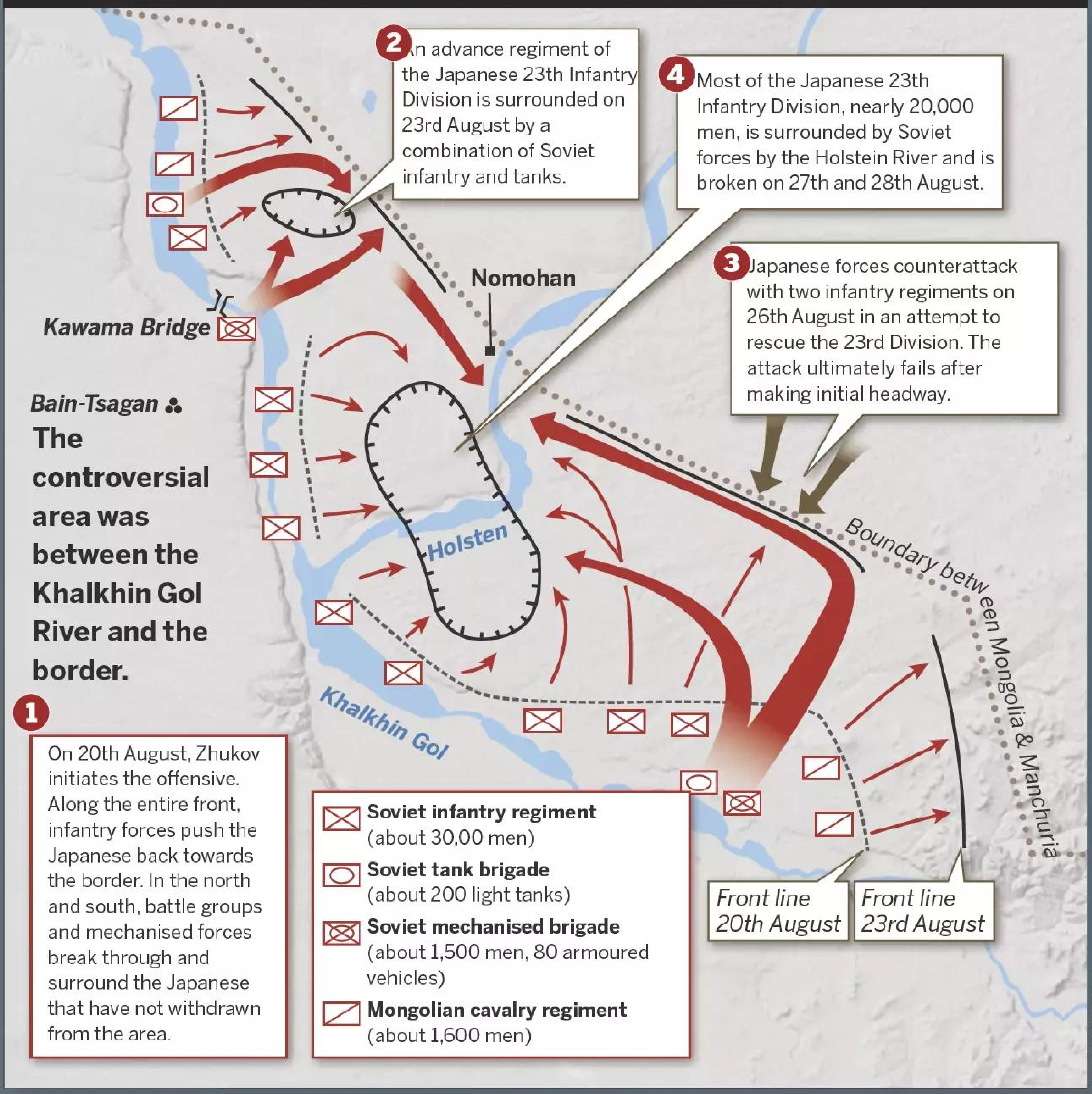
Japan's expansion led to several wars

★ From the mid-1800s, Japan had developed from a country with little or no contact with the outside world to a dynamic industrial society that adopted Western technology. In the struggle for influence over Korea and Manchuria, Japan fought a successful war against Tsarist Russia in 1904-05. In the 1920s, it became more nationalist and the military strengthened its grip on politics. The country's elite targeted not just the western empires' Asian colonies, but also looked to occupy Soviet-controlled areas in the Far East.

In 1931-32, Japan took Manchuria from China who appealed to the League of Nations for support. Japan increased its aggression towards China, who declared a full war in 1937.

The Soviet Union supported China with advisors and planes, but also fought its own border battles against Japan, the first was the Battle of Lake Khasan in 1938. The Soviet Union occupied strategic hills at the port city of Rashin in the north-east of Korea, then a Japanese colony. The Imperial Japanese Army tried to reclaim them, but had to withdraw after a two-week struggle. The next major battle was at Khalkhin Gol almost a year later.

Zhukov's offensive at Khalkhin Gol 24th–28th August 1939



The controversial area was between the Khalkhin Gol River and the border.

① On 20th August, Zhukov initiates the offensive. Along the entire front, infantry forces push the Japanese back towards the border. In the north and south, battle groups and mechanised forces break through and surround the Japanese that have not withdrawn from the area.

② An advance regiment of the Japanese 23th Infantry Division is surrounded on 23rd August by a combination of Soviet infantry and tanks.

③ Japanese forces counterattack with two infantry regiments on 26th August in an attempt to rescue the 23rd Division. The attack ultimately fails after making initial headway.

④ Most of the Japanese 23th Infantry Division, nearly 20,000 men, is surrounded by Soviet forces by the Holstein River and is broken on 27th and 28th August.

☒ **Soviet infantry regiment** (about 30,00 men)

○ **Soviet tank brigade** (about 200 light tanks)

⊠ **Soviet mechanised brigade** (about 1,500 men, 80 armoured vehicles)

◿ **Mongolian cavalry regiment** (about 1,600 men)

Front line 20th August

Front line 23rd August

ERIK LINDHOLM

Soviet soldiers from 149th Infantry attack north of the Holstein River during the fighting in late August.

AKG/TT-BILDBYRAN

Baal. Zhukov called on the 57th Special Corps in Tamtsakbulak in Mongolia. The corps' leader General Feklenko could not provide detailed information about recent events as he had not completed reconnaissance in the disputed area, 12 miles from their current position. Zhukov took a senior staff officer to the combat zone and interviewed local officers about the events. He noted that they had no information from the Japanese side.

Zhukov assumed that the fighting in May could be the prelude to a major incursion with far-reaching consequences. The 57th Corps was too small to prevent such an attack. Feklenko resigned and Zhukov took over as corps commander while he simultaneously strengthened the Soviet group in Mongolia with several infantry brigades bolstered with artillery units and tanks. Zhukov also requisitioned an air force squadron and 57th Corps was transformed into 1st Army Group in Mongolia.

Some of the Soviet Union's most experienced fighter pilots came with the new troops, which meant that Japanese assaults on military bases and airfields in the latter half of June came at a huge cost for the attacking forces. Following one such attack on the Tamtsakbulak airbase on 27th June, Tokyo banned the Japanese from any further air raids.

In June, the Imperial Japanese Army's 23th Division prepared a major attack on Khalkhin Gol. At this time the Japanese force consisted of 38,000 men, while Soviet-Mongolian forces amounted to 12,500. The Japanese had significantly more artillery and aircraft, but Soviet forces had superiority in armoured vehicles.

By the end of June, Lieutenant General Komatsubara Michitaro, who led the 23th Division, was sent to attack Red Army troops in the area east of Khalkhin Gol. Komatsubara planned a two-step operation; some troops would march on the Bain-Tsagan mountain and take the Kawatama bridge; the others would attack Soviet positions on the eastern banks and north of the Holstein River.

The Japanese concentrated over 10,000 men at Bain-Tsagan, where there were no more than 1,000 Soviet-Mongolian soldiers.

To stop the first Japanese who had crossed Khalkhin Gol, Soviet commander Zhukov launched a counterattack with 450 tanks and armoured vehicles, even though they had no infantry support. That same morning, Soviet aircraft began to drop bombs over the Japanese troops before they had managed to consolidate their positions in the mountains, while artillery provided protection in the form of an intensive barrage of fire.

The battle continued throughout 4th July. Despite heavy tanks losses, Zhukov didn't hesitate to repeat his efforts – particularly with no other effective means at his disposal. His tank forces attacked from three flanks forcing the Japanese to retreat to the other side of the river.

"TO CONCEAL THE MOBILISATION OF LARGE FORCES, THE RED ARMY UNDERTOOK A SERIES OF DECEPTIONS"

On 5th July, the Japanese troops' resistance was broken, and the remaining units retreated at great speed to the bridge that crossed the river. However, this was blown up by their own engineers and hundreds of Japanese soldiers and officers were thrown into the water, many of whom drowned. Several thousand bodies, a crowd of dead horses, many broken guns, grenade launchers, machine guns and cars lay strewn across the mountains, Zhukov later noted in his memoirs.

General Lieutenant Michitaro Komatsubara led the Japanese 23th Infantry Division at Khalkhin Gol.

A couple of days before the battle of the Bain-Tsagan mountain a smaller Japanese armoured force had begun an attack on the eastern side of Khalkhin Gol. It lost a large number of its tanks and after a week was driven back by a Soviet counterattack. Over the next two weeks there were several smaller skirmishes. The next major attack began on 23rd July, when after two days of artillery fire, the Kawatama bridge was taken, but the Japanese could not hold their positions.

Japanese High Command decided to regroup its troops to make a greater coordinated offensive towards the end of August. For that reason, the Sixth Army was added with 75,000 men who had air support from over 300 planes. They had planned to start this operation on 24th August.

At the same time, Zhukov prepared his major plan of attack to expel Japanese troops that were inside the Mongolian-Manchuria border. He had strict orders not to strike at bases and transport routes in Manchuria, and he should not pursue the enemy into Manchukuo's territory. These restrictions on Zhukov's actions were determined in Moscow, by Stalin, who would not risk a local border conflict escalating into a full-scale war.

To conceal the mobilisation of large forces, the Red Army undertook a series of deceptions. They used huge loudspeakers to imitate the sound of tanks and aircraft engines and transmitted fake messages about constructing defensive positions. Initially, these places were shelled by long-range Japanese artillery as the Japanese were lulled into the idea the Red Army was only preparing to defend itself. They reduced their bombardment and ►

Mongolia and Soviet Union

★ The feared Genghis Khan built the Mongol Empire in the 13th century. In the centuries that followed, the empire was divided until it fell into the hands of Manchuria's China in the 17th century.

When the last imperial dynasty in China fell in 1912, Mongolia declared itself independent. In 1919, China's military entered and occupied the country, but they were driven out by White Russian forces in 1921 who were subsequently defeated by Mongolian and Russian Communists that same year. In 1924, the People's Republic of Mongolia was proclaimed.

The ties between the countries were then tight, and they remained so until the Soviet Union's fall in 1991.

General Zhukov (on the right) with Mongolia's leader Marshal Khorloogiin Choibalsan in 1939.

▶ after 10-12 days halted it completely. Using radio, the Soviets created a complete web of misleading information using code they believed the Japanese would be able to break easily. It was designed to convince Japanese High Command that the Soviet Union intended to take up defensive positions before the autumn. The actual planning for the attack was undertaken by a small group of staff from the 1st Army Group, and only a few days before the attack, orders were distributed to the commanders of the other forces.

At the same time around 3,000 trucks drove tens of thousands of tonnes of ammunition and bombs for artillery and aircraft to the area closest where the attack would begin. The all-important troop relocation was done at night and then they were camouflaged to blend in with their surroundings. Information from agents indicated that the concealment of the immense force had succeeded in misleading the Japanese. Zhukov's total forces exceeded 57,000 men and could count on support from more than 500 fighter aircraft and two Mongolian cavalry divisions.

Zhukov decided to launch the offensive on a Sunday, since intelligence had shown that many of the Japanese senior officers were away from the troops at the weekend. Early in the morning of 20th August, Soviet forces crossed Khalkhin Gol. At 06.00, a massive artillery barrage began, as more than 150 bombers escorted by combat aircraft dropped bombs over enemy front lines, artillery posts and reserve units. At 09.00, the tanks, infantry and the Mongolian cavalry were in motion. The artillery preparations had been extensive enough for the breakthrough to be possible.

“KHALKHIN GOL BECAME THE FIRST REAL TEST OF COMBINING ALL WEAPONS IN A FAST-MOVING OPERATION”

Over the first few days, Zhukov's forces moved along the flanks largely according to plan. In those areas that encountered stronger resistance, reserve forces were put in place. On 26th August, the Japanese 23rd Division was completely surrounded, and the Red Army were able to relentlessly attack – and slowly reduce – the Japanese troops until 31st August. Japanese resistance was incredibly tough everywhere; Zhukov wrote in his reports that the soldiers in Kwantung Army had literally fought to the last man having made good tactical decisions.

During the weeks that followed, there were only minor dogfights and a few failed attempts to break through Soviet-Mongolian forces along the border. Japan signed a ceasefire agreement on 15th September, 1939, which came into force the following day, committed to respecting Mongolia's borders according to the Soviet interpretation.

The total Japanese losses during the summer war have different estimates in Japanese, Soviet and Post-Soviet historical works. Both sides' initial calculations have been subject to investigation by military historians. By today's estimates, Japanese losses are estimated to be around 61,000 killed, missing or captured. Casualties on the Soviet side were – according to the latest calculations in the 1990s, using archives as a basis – closer to 8,000 killed or missing and almost 16,000 wounded. Until the beginning of the 1990s, official Soviet history treated any analysis of their own casualties as a taboo subject, so further research remains to be done for the information to be determined with any greater clarity.

For Zhukov, Khalkhin Gol became the first real test of combining all weapons in a fast-moving operation, thus testing the Red Army's doctrine that had been established in the 1930s. For leading the battle, he was rewarded with his first Hero of the Soviet Union medal, and was given command of the Kiev Military District.

Although Japan downplayed the events by describing them as the "Nomonhan Incident", it had suffered a defeat that had strategic consequences. First, the defeat led to it abandoning its ambitions on the Soviet Far Eastern territories, so Japan turned its attentions on the Dutch East Indies (now Indonesia) as well as both French and British colonies in South-east Asia.

In addition, the Red Army proved a completely different foe to that imagined by Japanese officials. They were caught by their memory of winning the Russo-Japanese War in 1904-05, combined with Japanese observers overestimating the impact of the bloody purges in the Soviet military in 1937-38.

Third, the Kwantung Army's free rein was reduced. The Japanese focused on the war in China, while continuing the strict defence of Manchuria. In 1941, Japan decided not to join Germany's attack on the Soviet Union since it had anticipated early that the outcome of this war was not a given; instead, the country held to the Soviet-Japanese Neutrality Pact it had signed in April 1941.

The strategic situation was very different for the Soviet Union. Its victory at Khalkhin Gol would have much wider consequences than the limited nature of the summer war. It had reduced the risk of the nightmare scenario that had plagued the Red Army in the 1930s, namely the prospect of a multi-front war against Nazi Germany and its fascist allies in the west and Japan in the Far East.

In the five-year plans after 1932, emphasis was placed on building military industries in the Urals, western Siberia and the Pacific, to guarantee access to war materiel. Yet, it was far from given it would provide the Soviets with enough resources for the nightmare scenario. The fact that Stalin successfully signed a non-aggression pact with Hitler shook Tokyo's confidence in its fellow signatories of the 1936 Anti-Comintern Pact, which was an anti-Soviet alliance between fascist states.

To conclude, it can be noted that German High Command did not heed the Red Army's success during the summer war in 1939. In surveys published in 1940-41, German observers pointed out the Red Army's failure in the first phase of the invasion of Finland in November and December 1939. The Soviet blunders in the Winter War – miserable planning, a lack of coordination and lack of discipline in the Red Army – were highlighted in Nazi propaganda, while the positive results of the summer war were forgotten when drawing up the plans for Operation Barbarossa – the invasion of the Soviet Union – in Berlin. ✪

Lennart Samuelson is a lecturer in economic history and researcher at Stockholm School of Economics.

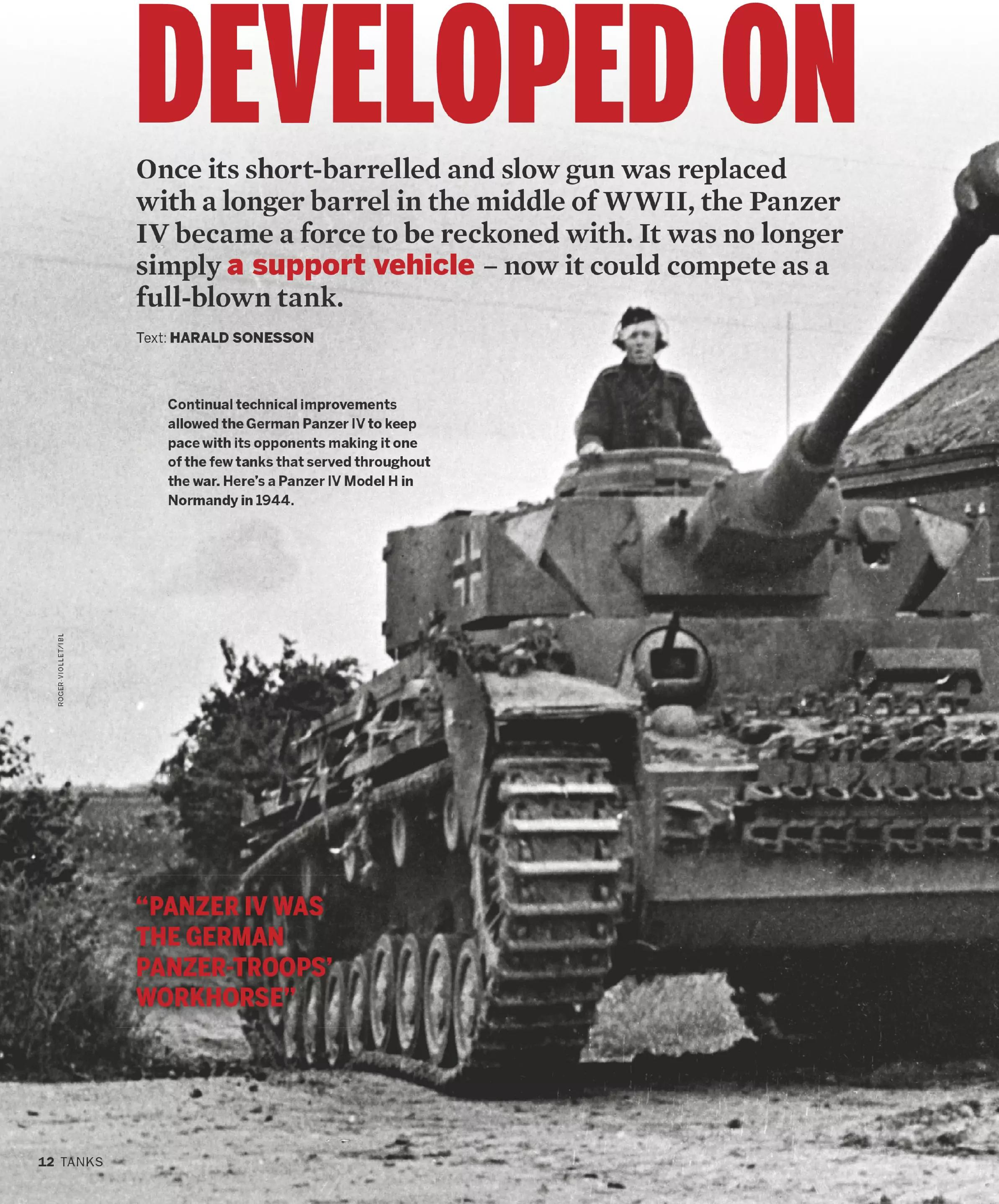
Further reading: **Memories and Reflections** (1985) by Georgy Zhukov. ★ **The Soviet Union and the Threat from the East, 1933–41** (1982) by Jonathan Haslam. ★ **Nomonhan, 1939** (2012) by Stuart Goldman

Mongolian soldiers, with a lightweight DP machine gun, during the battle of Khalkhin Gol.

DEVELOPED ON

Once its short-barrelled and slow gun was replaced with a longer barrel in the middle of WWII, the Panzer IV became a force to be reckoned with. It was no longer simply **a support vehicle** – now it could compete as a full-blown tank.

Text: **HARALD SONESSON**



Continual technical improvements allowed the German Panzer IV to keep pace with its opponents making it one of the few tanks that served throughout the war. Here's a Panzer IV Model H in Normandy in 1944.

ROGER-VIOLLET/IBL

"PANZER IV WAS THE GERMAN PANZER-TROOPS' WORKHORSE"

THE BATTLEFIELD

When the German Wehrmacht invaded Poland on 1st September, 1939 it provided the first example of its lightning-fast tactics that would become known as blitzkrieg. At the outset of war, there was virtually no consensus within German High Command on how to utilise the different forces, which equipment was best for specific tasks and so on. Experiences from Poland and the campaigns that followed were strongly influenced by materiel development, training and performance.

The armoured forces that received a fire of baptism in the Poland campaign were the result of a purposeful, but not fixed, development rooted in World War I. After violating the peace conditions set out in the Treaty of Versailles, the Wehrmacht ensured they were able to develop tactically and technologically in areas they considered important for the future.

Tanks and their use were examples of this evolution. The first cautious steps in tank development had already been taken already in 1926, long before the Nazis came to power. A rather surprising partner in this work was the Soviet Union. After signing an agreement in 1926, the secret *Panzertruppenschule Kama* (Kama tank school) operated from 1929-33 near Kazan, 75 kilometres east of Moscow – here officers were trained while tanks and artillery were tested at the secret Russo-German facility.

THE FIRST STEPS to producing what would become one of WWII's most famous tanks had therefore already begun by 1930, but actual development on the Panzer IV only started in 1935 when Krupp was awarded the contract. The first 35 mass-produced tanks (model *Ausführung A*) were delivered in 1937 and 1938.

The Panzer I and II had been developed a few years before the Panzer IV, but the Panzer III's development ran concurrently with the Panzer IV. All four tanks had different armaments and characteristics. The idea was to assemble forces with a mix of tanks to tackle different tasks.

The Panzer I, "Krupp's sports car", had a two-man crew, was only armed with machine guns and was, in principle, only effective against unprotected or poorly protected targets. The Panzer II was equipped with a 20-mm automatic gun and three-man crew, while the Panzer III had a 37-mm gun and a crew of five, capable of fighting both armoured and soft targets. The Panzer IV was originally intended as a support vehicle for combatting soft targets such as armed platoons in fire fights and field ▶

battles. Its weapon was a short 75-mm gun that could also be used for indirect fire.

THE TANKS' MAIN tasks as agreed by German High Command were to support the infantry, work together with other mobile weapon systems and fight other tanks.

The final job was critical to the Panzer III and – to a lesser extent – the Panzer II, but was initially handled largely by separate anti-tank guns.

General Staff chief *Generaloberst* Ludwig Beck was nevertheless uneasy about the impact of well-armoured tanks with more powerful armaments on potential enemies, primarily France. He thought that 20-mm and maybe even 37-mm guns were too weak to fight them. As a consequence, the Panzer III should be equipped with a 50-mm gun, while increasing the numbers of Panzer III and IV at the expense of Panzer I, which only had machine guns.

The industry's need to develop continuous mass production capabilities, coupled with the fact development on Panzer III and IV hadn't been prioritised, led to significantly more Panzer I tanks being produced than were needed. In fact, the heavier tanks' development was so compressed the first models should really be considered prototypes.

THE GERMANS MANUFACTURED around 1,000 Panzer IV models A-F from 1937-42. Outwardly they appeared similar, but incremental improvements based on battlefield experience were being introduced. At first the Panzer IV was reminiscent in many ways of the Panzer III; the most obvious difference being its short 75-mm gun.

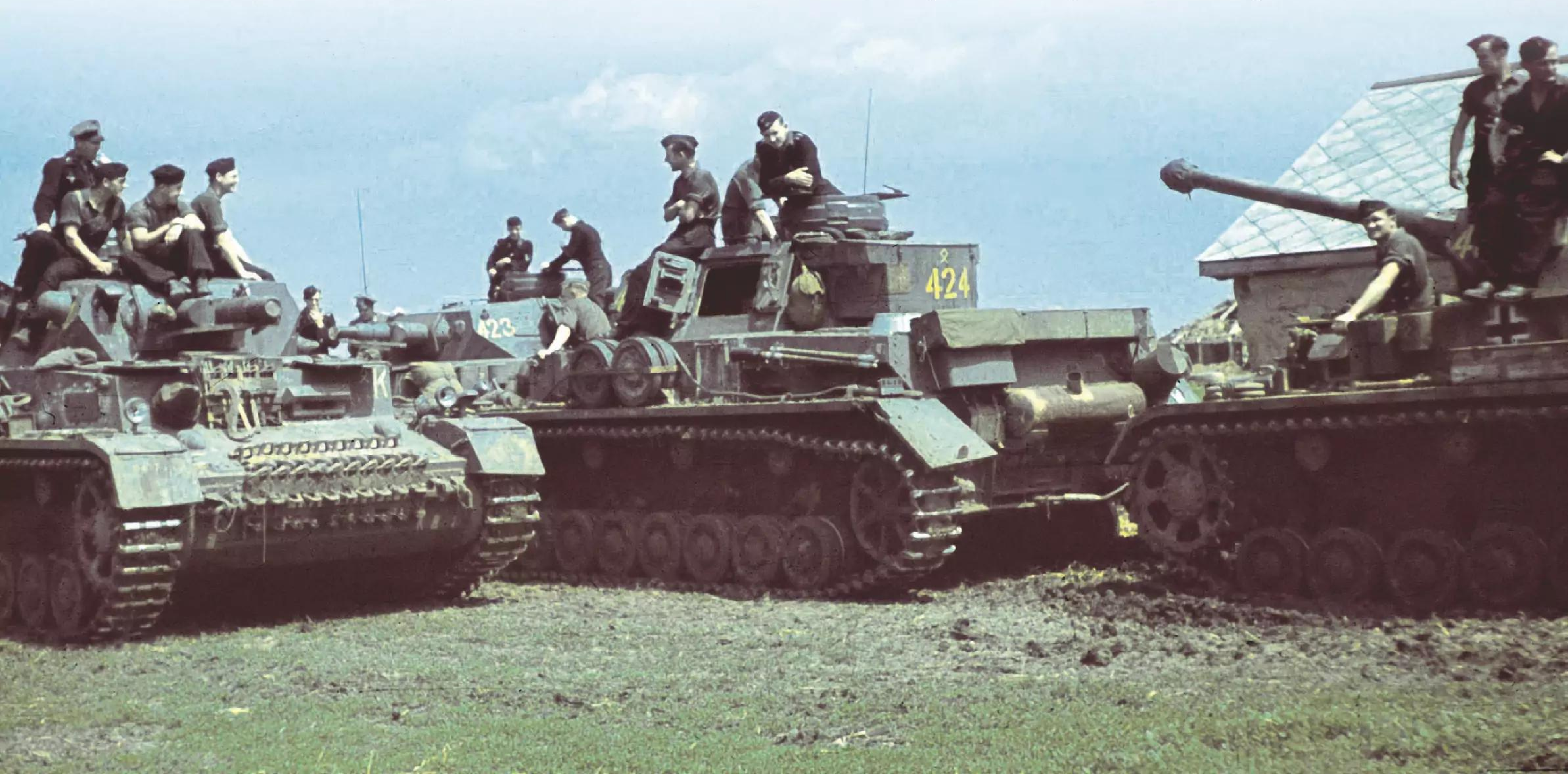
The tank had a five-man crew: tank commander, gunner, loader, driver and radio operator/bow machine gunner. The latter two had their seats in the front of the hull and the others were in the turret. All crew members had access to their own hatch to get in and out of the tank. The hatches of the gunner and the loader were located on the sides of the turret. The tank was usually equipped with radio (transmitter/receiver) and internal communication facilities for the crew.

Observation potential was good, and the tank commander could take in the full horizon from his observation hood. The lid could be locked in relation to the position of the tank hull when the turret was counter-rotated, which made it easier for the gunner to sight his target in combat.

THE GUNNER HAD good all-round vision to aim the main gun and his machine guns. The turret could be swivelled both manually and via an electric motor. Fine adjustments were made – usually by hand because the electrical system could be unreliable – just before opening fire. Adjusting the gun's height was also done manually. The gunner fired the parallel-connected machine gun mechanically with a foot pedal while the gun was fired electrically with a button on the side handle. The gun was best used when stationery, as a direct hit was unlikely while moving.

The loader's job was to keep track of the 80 rounds that were loaded into the hull (models B to F), plus load the gun and machine guns. Available

> **"INCREMENTAL IMPROVEMENTS BASED ON BATTLEFIELD EXPERIENCE WERE INTRODUCED"**



A platoon of Panzer IVs from the 14th Panzer Division on their way to Stalingrad in the summer of 1942. The three cars on the left are F1 models while the right is a model F2 or G with longer gun.

BUNDESARCHIV/BILD169-0116

ammunition was high explosive (HE), armour piercing (AP) and shaped-charge rounds (HEAT – high explosive anti-tank) as well as smoke and grapeshot/cannister rounds. The armour-piercing and shaped-charge anti-tank rounds were primarily intended to fight armoured targets.

The driver sat in the front left side of the hull. To help handle the Maybach engine, he had a gearbox with six forward gears and one reverse. Maximum speed was about 40 km/h and the range around 200 kilometres. To the right of the driver was the radio operator who was also the bow machine gunner. His main task was to oversee the radio and machine gun that was mounted on the hull.

The armour was arranged in the usual way before the Soviet T-34/76 debuted on the battlefield, with many surfaces vertically mounted or with only a slight slope. Armoured plating at the front protected against shrapnel and small-calibre fire.

DURING THE CAMPAIGN in Poland, the Panzer IV operated in open terrain as a support tank. Enemy resistance nests, machine gun positions, anti-tank positions and more could often be attacked over distances where enemy fire had no or little effect. In combat in densely populated areas the battle distance was short and the Poles had greater opportunity to battle the tanks. The Polish army had few tanks equipped with guns. Therefore, defensive mines, anti-tank guns and artillery of various kinds made up most of the resistance that the tanks encountered.

The Panzer IV's flexibility and accuracy during fire fights was repeatedly noted in war diaries. At Warsaw on 8th September, 1939, for example, a Panzer IV unit discovered a reinforced enemy battery in its path. After receiving fire from a 155-mm howitzer and 75-mm field gun, the unit immediately went on the attack and took out two of the howitzers and field guns, plus a number of machine guns, anti-tank guns and 160 horses. They also took large numbers of Polish soldiers prisoner, including two officers.

The experience gained from the Polish campaign resulted in numerous modifications being made to both existing models as well as being added to the latest model in development: *Ausführung E*. Armour thickness was increased, and the commander's hatch was moved forward on the turret; previously, it had overhung at the back.

The Panzer IV was also now deployed in medium-sized companies as standard. The number of Panzer IVs per company had to be reduced from 14 to eight as tank forces were set up faster than new tanks could be delivered.

More lessons were learned during the campaign in France to add to the observations made in Poland,

►

Panzer IV was made in ten versions

Panzer IV underwent continuous improvements during its years of service.

Panzer IV D.

ULLSTEIN/IBL

Versions Panzer IV was produced in ten different Ausführung versions	**Production**	**Armour (mm) in front turret/hull** (basic version)	**Weight in tonnes**	**Horsepower per tonne**	**Ground pressure kg/cm2**	**Quantity produced**
Ausf A	Oct 37 – Mar 38	15/15	18.0	12.8	0.68	35
Ausf B	Apr 38 – Sep 38	30/30	18.5	14.3	0.77	42
Ausf C	Sep 38 – Aug 39	30/30	18.5	14.3	0.77	134
Ausf D	Oct 39 – May 41	30-35/30	20.0	13.3	0.83	229
Ausf E	Sep 40 – Apr 41	30-35/50	22.0	12.0	0.91	223
Ausf F1	Apr 41 – Mar 42	50/50	22.3	11.9	0.88	462
Ausf F2	Mar 42 – Jul 42	50/50	23.6	11.2	0.93	200
Ausf G	May 42 – Jun 43	50/50 (+30)	23.6	11.2	0.93	1,687
Ausf H	Apr 43 – Jul 44	50/80	25.0	10.6	0.89	3,774
Ausf J	Jun 44 – Mar 45	50/80	25.0	10.6	0.89	1,758

Important improvements

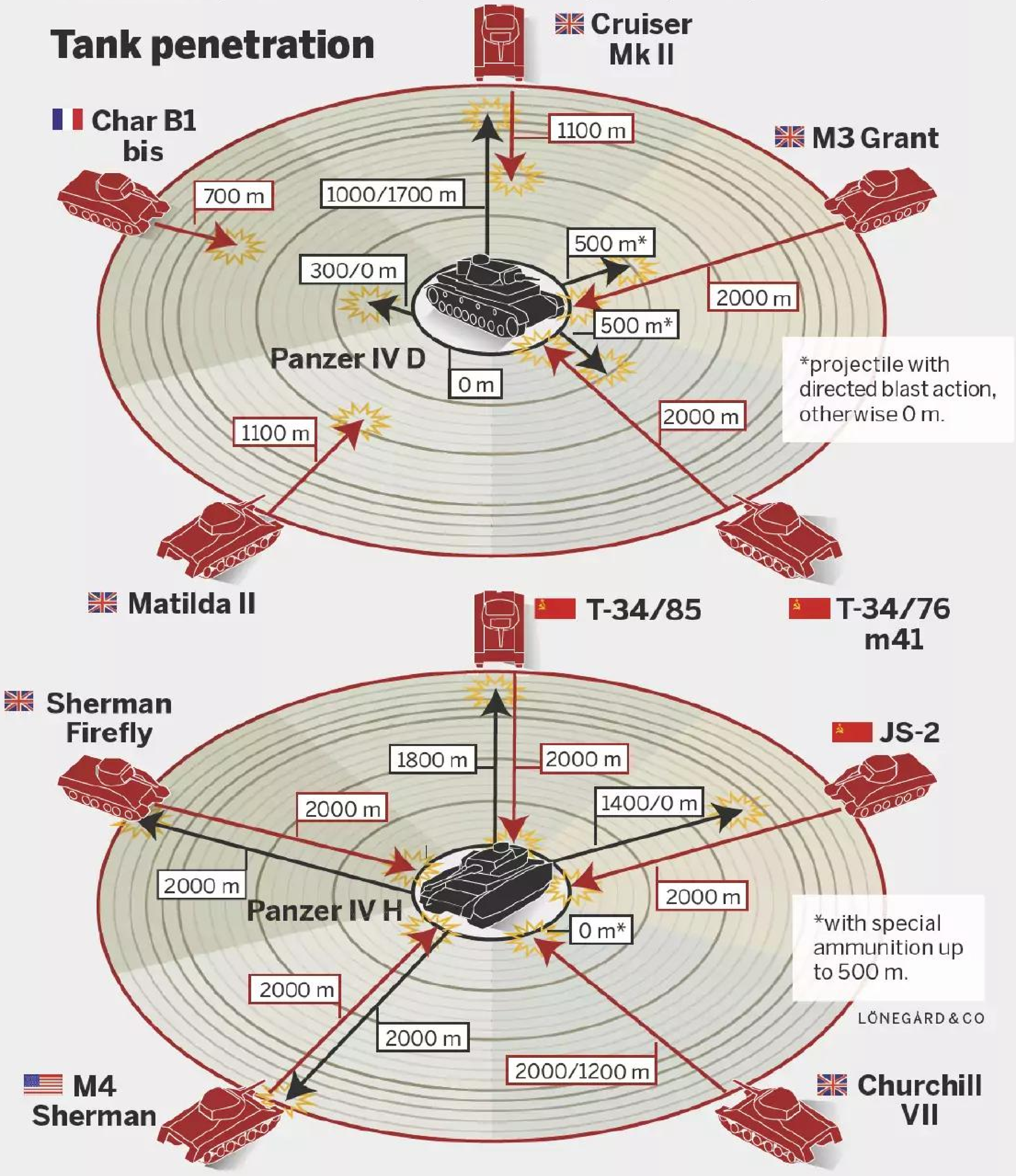
Ausf B **gun:** L/24	Front suspension in the hull and turret is improved. The tank gets a stronger engine and six forward gears.
Ausf C **gun:** L/24	A more fuel efficient engine with the same amount of horsepower is introduced. The range increases from 142 to 188 km on the road, and from 94 to 134 km off it.
Ausf D **gun:** L/24	External shield for turret gun is introduced. The armour on the hull and the sides of the turret and rear are reinforced.
Ausf E **gun:** L/24	The armour on the front of the hull increases. The commander's observation hood is also reinforced. The weight increases by two tonnes.
Ausf F1 **gun:** L/24	Armour is further reinforced in the turret and sides of the hull. New drive assembly with wider track – 40 instead of 36 cm. The side panels on the turret of the loader and gunner change from one hatch to two smaller ones.
Ausf F2 **gun:** L/43	The short gun barrel is replaced with a long one. Storage space for ammunition is altered to accommodate the larger shells.
Ausf G **gun:** L/48	During the production of this model, the longer L/48 gun is introduced. In some cases, they had to mount a L/43 gun and then switch to the L/48 at the first opportunity. Some tanks gain additional 30-mm armour plating to the front, plus loosely mounted additional plating (*Schürzen*) is fitted to the hull and turret in spring 1943.
Ausf H **gun:** L/48	The turret roof and the front of the hull are reinforced. The antenna is moved from the right side to the rear left corner.
Ausf J **gun:** L/48	The DKW two-stroke engine that powered the electric generator for rotating the turret is removed, and a new manual mechanism replaces it. An extra 210-litre fuel tank is mounted on individual tanks where the old engine was sited. The range increases to 272 km on road and 194 on rough ground.

The tank in the field

Panzer IV and its opponents

Tanks Panzer IV and regular opponents at different times.	**Weapons** L-value indicates barrel length relative to calibre.	**Armour (mm) front turret/hull** * Sloping armour, provides better protection.	**In service**	**Horsepower per tonne**	**Ground pressure kg/cm2**	**Range km on road/in terrain**
Panzer IV D	75-mm L/24	30-35/30	1939	13.3	0.83	188/134
Char B1 bis	75-mm L/17 and 47-mm L/32	55/40-60	1937	8.0	0.85	140/100
Matilda II	40-mm L/52	75/45-78	1939	7.2	1.12	257/129
Grant	37-mm L/56 and 75-mm L/31	51-76/38-51	1941	14.3	1.20	193/-
Cruiser Mk II	40-mm L/52	30/22-30	1940	10.3	0.94	225/160
T-34/76 m41	76.2-mm L/41	52/45*	1941	17.9	0.64	455/260
Panzer IV H	75-mm L/48	50/80	1943	10.6	0.89	188/134
T-34/85	85-mm L/53	45-90/47*	1944	17.0	0.87	300/160
JS-2	122-mm L/48	100/90-120*	1944	11.3	0.82	240/210
Churchill VII	75-mm L/40	152/139-152	1943	8.7	0.94	145/-
Sherman M4	75-mm L/40	76-89/51	1941	13.2	1.10	200/145
Sherm. Firefly	7,62 cm L/40	76-89/51	1944	13,0	0,96	200/145

Tank penetration



*projectile with directed blast action, otherwise 0 m.

*with special ammunition up to 500 m.

LÖNEGÅRD & CO

★ The diagram shows the approximate strike distance of the Panzer IV and various Allied tanks it fought. The numbers refer to a strike on the front of the enemy's hull. Where the thickness of the front panel varies, two numbers (turret/hull) are indicated. In fact, the battle distance was often significantly shorter. It was influenced by the weapon's effect, visual optics, armour quality and ammunition type.

▶ while at the same time the Panzer IV met for the first time an equal or superior tank. French tanks usually performed defensively in small groups. The Germans were surprised that they could occasionally move unhindered close to the French tanks without being discovered. One of the reasons for this was that French crews divided their roles in such a way to make it difficult for them to fulfil their duties.

The Germans noticed that their own tanks were also inadequate, and that the Panzer IV was the only tank with any chance of combatting the heavier French tanks at anything but extremely short distances. The Panzer IV also worked well at combatting enemy troops in built-up areas. Their high speed over rough terrain also make it difficult for French tanks to defeat them.

We kept our eyes peeled like hawks. Eyes on gun optics; hands on the cranks for the gun mechanisms and triggers. We searched the terrain attentively... The entire crew of the tank was on high alert—their lives were at stake and it was imperative to break through the enemy position. Whoever sees the enemy first and fires first has the advantage... It was oppressively hot in the tanks. Everyone suffered from thirst... [All were] short on ammunition as a consequence of the hard fighting.

Gunner Heinz Günther Klose, 5th June, 1940.

SPRING 1941 SAW the first deliveries of the F model. Thicker armour had been introduced, and so the weight had increased. To prevent the ground pressure becoming too much, wider tracks were introduced into a modified drive assembly.

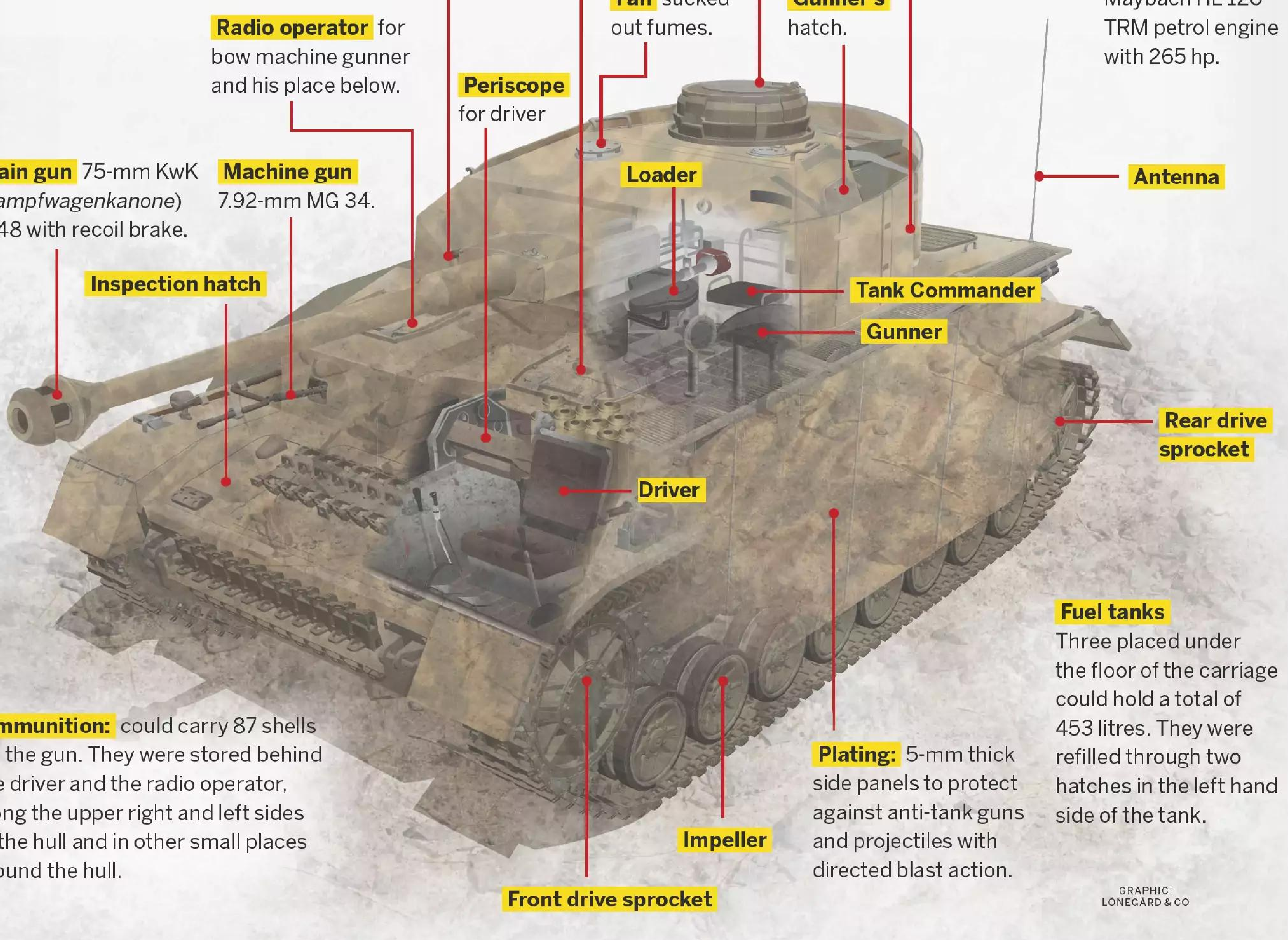
In March 1941, the Panzer IV was deployed with German forces to North Africa. The climate and terrain were hard on both personnel and equipment. Mechanics had to work under high pressure to maintain the number of usable vehicles. The Panzer IV was adequate, but when it came to mobile tank warfare, the Panzer III performed better with its long 50-mm gun.

When Operation Barbarossa was launched in June 1941, the Germans ran into trouble when they encountered tanks they'd never come across before in the form of the legendary T-34/76 and KV-1 heavy tanks. When Soviet tanks began to be deployed in increasing numbers during the autumn, the Germans needed a fast solution to combat these almost invulnerable tanks. Anti- ▶

"THE CLIMATE AND TERRAIN WERE HARD ON BOTH PERSONNEL AND EQUIPMENT"

Panzer IV H

3,774 Panzer IV H tanks were built in 1943-44.



Machine gun 7.92-mm MG 34, parallel connected.

Tank commander's observation hatch Protective plates were placed in front of the viewing ports

Armour cladding Side turret plates

Engine The tank was powered by a 12-cylinder Maybach HL 120 TRM petrol engine with 265 hp.

Driver's Hatch

Fan sucked out fumes.

Gunner's hatch.

Radio operator for bow machine gunner and his place below.

Periscope for driver

Main gun 75-mm KwK (*Kampfwagenkanone*) L/48 with recoil brake.

Machine gun 7.92-mm MG 34.

Loader

Antenna

Inspection hatch

Tank Commander

Gunner

Rear drive sprocket

Driver

Fuel tanks Three placed under the floor of the carriage could hold a total of 453 litres. They were refilled through two hatches in the left hand side of the tank.

Ammunition: could carry 87 shells for the gun. They were stored behind the driver and the radio operator, along the upper right and left sides of the hull and in other small places around the hull.

Plating: 5-mm thick side panels to protect against anti-tank guns and projectiles with directed blast action.

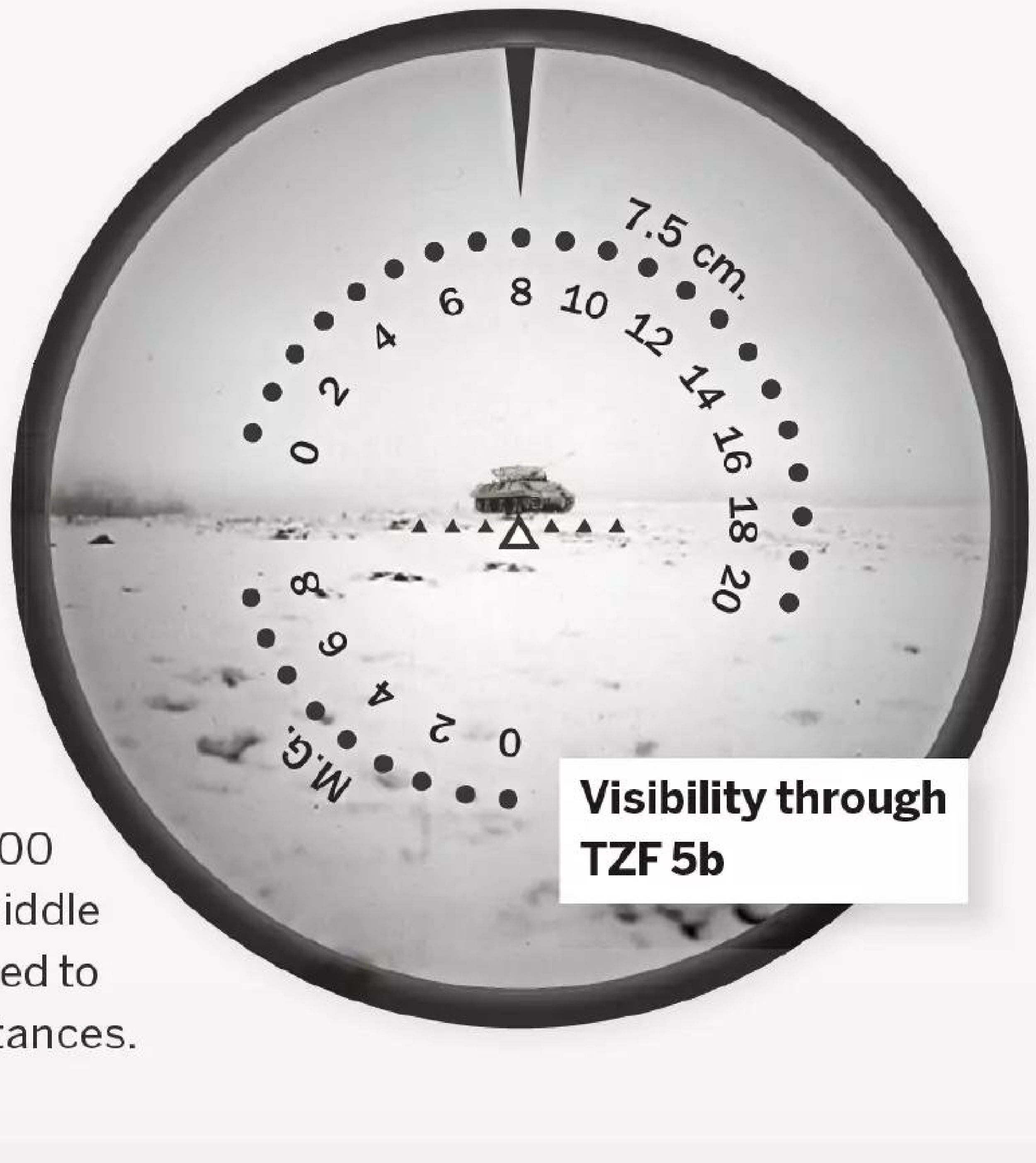
Impeller

Front drive sprocket

GRAPHIC: LONEGARD & CO

Sight

★ The Panzer IV-F1 was equipped with telescopic sight TZF 5b. It had 2.5x magnification and a 23.5-degree field of view. There were two scales on-screen, one for the gun (up to 2,000 m) and one for the machine gun (up to 800 m). Triangles in the middle of the screen were used to aim and measure distances.



Visibility through TZF 5b

Ammunition

	Panzer IV A–F1		Panzer IV G–J	
Gun	75-mm KwK 37 L/24		75-mm KwK 40 L/48	
Ammunition	**K Gr rot Pz**	**Gr38 HL/A**	**Pzgr 39**	**Pzgr 40**
Output speed	385 m/s	450 m/s	790 m/s	990 m/s
	Penetration of armour plating at 30° slope			
100 m	41 mm	70 mm	106 mm	143 mm
500 m	39 mm	70 mm	96 mm	120 mm
1,000 m	35 mm	70 mm	85 mm	97 mm
1,500 m	33 mm	70 mm	74 mm	77 mm
Shell type	Armour-piercing capped (APC)	High-explosive anti-tank (HEAT)	Armour-piercing ballistic cap (APBC)	Armour-piercing composite rigid (APCR)

The low firing velocity on early Panzer IVs made hitting moving targets more difficult as the time between firing and reaching the target increased.

Tanks based on Panzer IV

A variety of tanks were developed from the Panzer IV – everything from a tank that could run under water to one that could lay bridges.

Tauchpanzer IV.

Tank variants

★ *Panzerbefehlswagen IV* was a command tank with extra communication equipment, and *Panzerbeobachtungswagen* was an artillery observation vehicle. In 1940, 42 *Tauchpanzer IV* submersible medium support tanks were produced.

Wirbelwind.

Anti-aircraft guns

★ After the Luftwaffe became incapable of protecting ground troops, self-propelled anti-aircraft guns built on Panzer IV chassis were developed: in 1943, the *Möbelwagen* with a 37-mm flak gun, followed by *Wirbelwind* (four 20-mm flak) and *Ostwind* (a 37-mm gun).

▶ tank guns were mounted on different vehicles, but new types were also needed. The Panzer III had reached its limit – it wasn't possible to mount a stronger gun on it. Again, the Panzer IV came to the rescue.

It was already equipped with a short 75-mm gun. Now a longer barrel (L/43) was installed on the model F, which had gone into production, radically changing both the tank's profile and performance. These variants were named the Panzer IV F2; those that retained the shorter gun became the F1.

In contrast to the howitzer features of the previous gun, the new anti-tank gun came with a high output velocity at a flat trajectory, which meant a shorter time in flight and a larger energy release on impact. Thus, the Panzer IV changed from being a support vehicle to being a 'proper' tank. It could now take up the fight with T-34 and KV-1 tanks on equal terms except for one point: it had inferior armour protection.

The new gun worked with the *Panzergranate 40* armour-piercing composite rigid (APCR) shell made from tungsten. The shell offered better armour penetration of distances up to 1,500 metres, but a lack of raw materials meant they were never manufactured in large quantities, and became increasingly scarce from 1943 on.

IN MARCH 1942, the Panzer IV G arrived. Initially it had the same gun as the F2, but was later given an even longer barrel (L/48). It was eventually fitted with additional armour at the front of the hull. As a result of the longer gun, the load on the front of the track assembly increased. In the spring of 1943, external armour known as *Schürzen* (camouflage) was fitted to the turret and hull, designed to offer better protection against anti-tank guns and the explosive effects of armour-piercing projectiles.

Model H, which arrived in spring 1943, had thicker armour at the front. By this time the tank had increased its weight significantly – from 21 tonnes for the model E to 25 tonnes for the Panzer IV H – and mobility suffered. Just like other German tanks during the war, no attention had been paid to facilitating large-scale production. Nevertheless, the model H was still manufactured using a simplified production process.

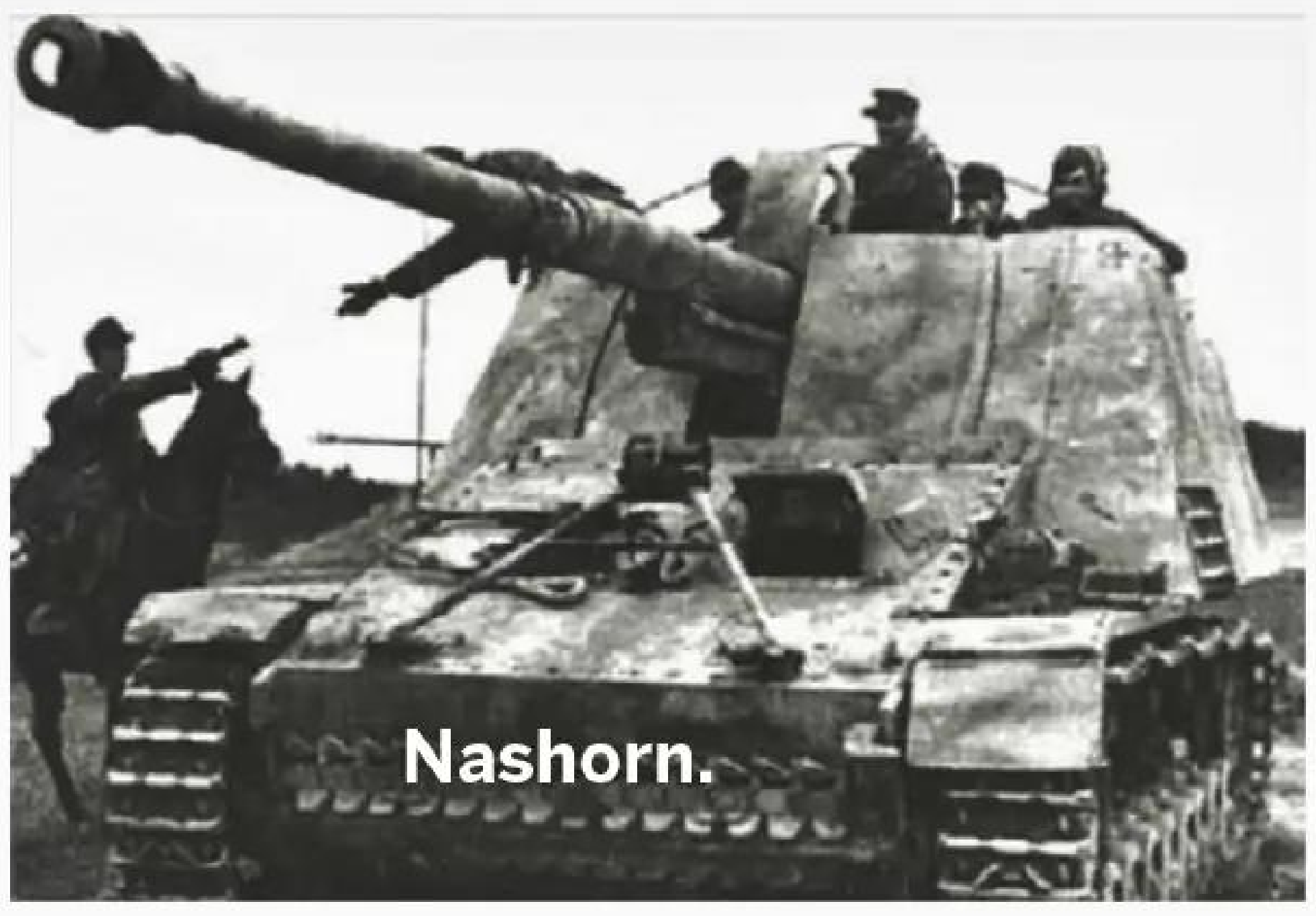
The final model of Panzer IV was model J, which made its bow in the summer of 1944. On this, further simplifications were made, partly to facilitate production, partly due to component shortages. For example, the electric generator to power the turret was removed.

HOW GOOD WAS the Panzer IV? As the war progressed and US and Soviet tank production scaled up, it appeared the tank's largest flaw was its extremely complex manufacturing process. This, coupled with the fact that the factories did not have much experience in mass production, made it impossible to reach required production volumes.

Of course, other factors also played a role – among other things, there was a shortage of raw materials and qualified production labour. One positive aspect of the design was that it was upgradeable with both a stronger gun and thicker armour.

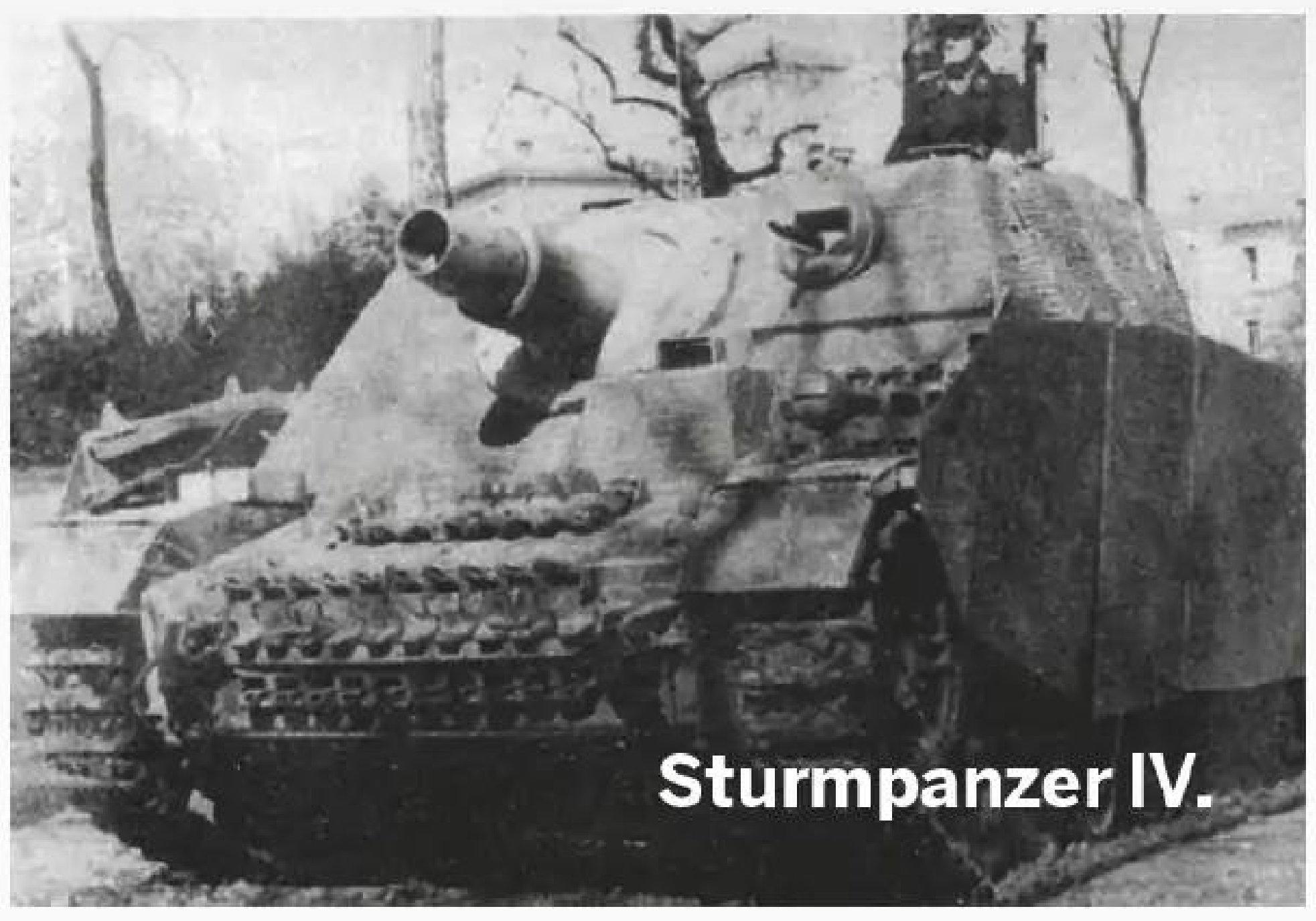
Firepower was capable enough until it met the heavily armoured French tanks in 1940. In the desert the short 75-mm gun was good for support, but not practical for mobile armoured warfare. On the Eastern Front it ran into early problems when it was unable to take on the new Soviet KV and

Further reading: Panzer IV on the Battlefield (2016) by Craig Ellis ★ **Panzer IV Vs Sherman** (2015) by Steven Zaloga & Richard Chasemore.


Nashorn.

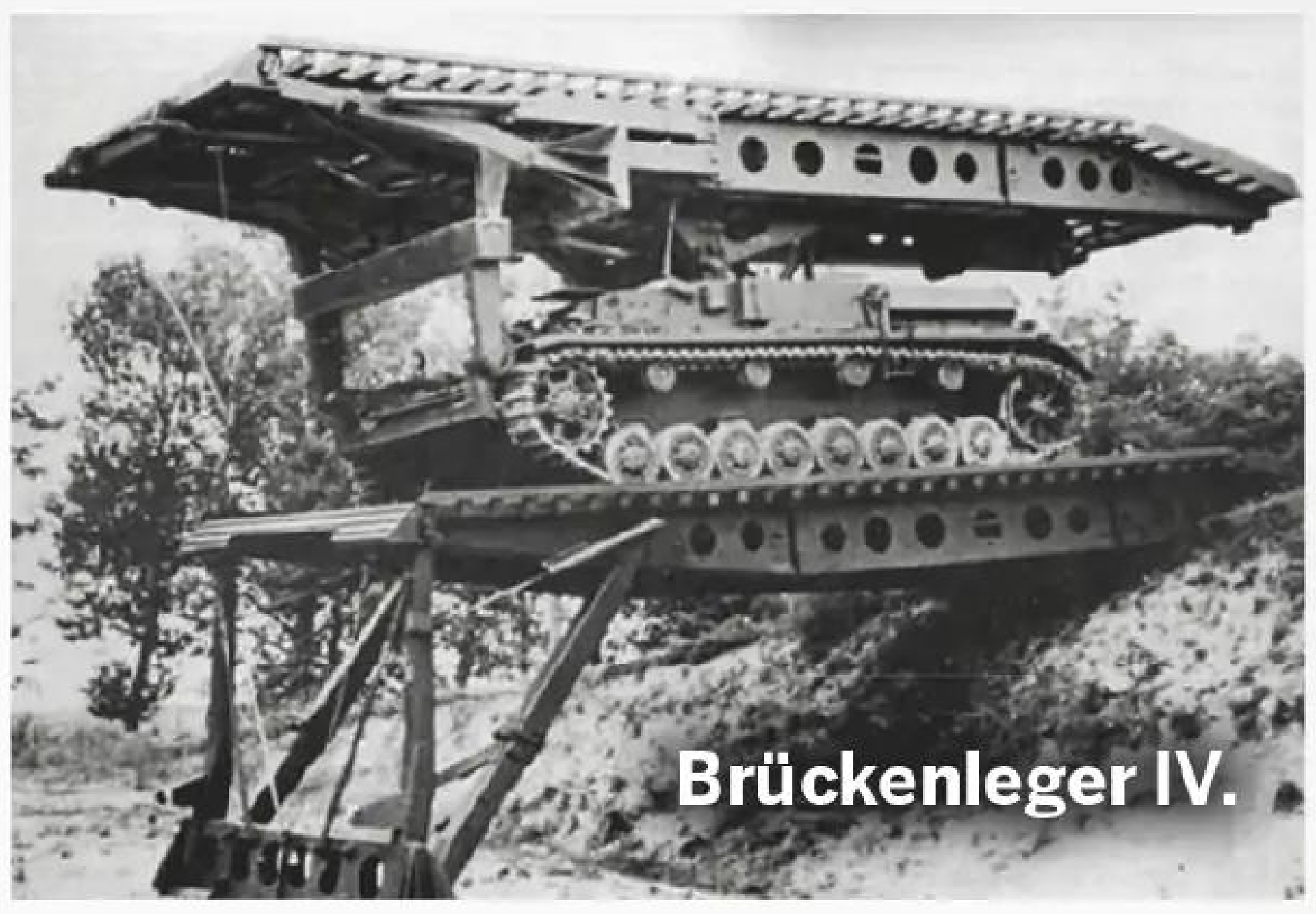
Anti-tank guns

★ In 1943, the *Nashorn* tank destroyer was built, its hull containing Panzer III and IV parts. The carriage was equipped with an 88-mm PaK 43/1/L71. The following year, the turretless *Jagdpanzer IV* was built with a 75-mm L/48 or L/70 anti-tank gun.


Sturmpanzer IV.

Tank and infantry support

★ *Hummel* was mounted on a *Nashorn* hull and its 155-mm howitzer provided support to armoured forces in 1943; at the same time, *Sturmpanzer IV* helped the infantry, who also received support later that year from the *Sturmgeschütz IV (StuG IV)* and its 75-mm 40/L48 gun.


Brückenleger IV.

Special vehicles

★ Several different non-combative vehicles were also built, such as the *Brückenleger IV* which was used to build bridges, the *Munitionspanzer* which was an ammunition truck and the *Bergepanzer IV* which was a lifeboat.

T-34/76. The short barrel's problem was that direct hits were hard because of the projectile's low output speed – and lack of impact when first hit.

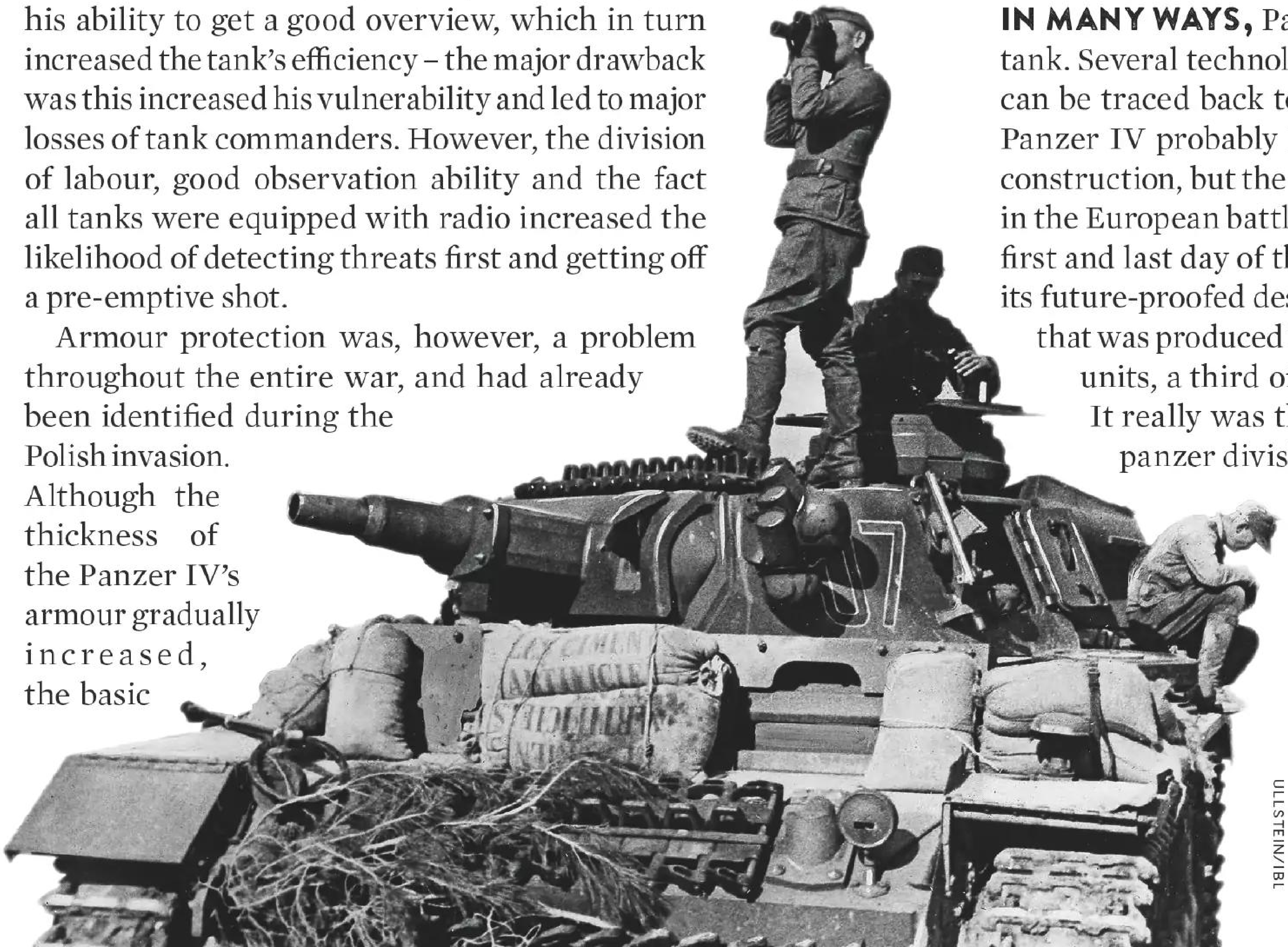
Once the longer (L/43) 75-mm gun was mounted after spring 1942, fire power improved dramatically. Now there was a gun with both good accuracy and impact. These aspects were further enhanced when a few months later, an even longer barrel (L/48) was introduced.

THE CREW'S ABILITY to identify targets quickly and accurately was one of the most critical aspects of a tank's survival and function. With a five-man crew, the workload on the Panzer IV was evenly distributed. The tank commander was responsible for observation, and the other crew members helped along with their other jobs.

It meant the commander wasn't tied up with potentially distracting side-issues. He was trained to observe from the turret hood, which increased his ability to get a good overview, which in turn increased the tank's efficiency – the major drawback was this increased his vulnerability and led to major losses of tank commanders. However, the division of labour, good observation ability and the fact all tanks were equipped with radio increased the likelihood of detecting threats first and getting off a pre-emptive shot.

Armour protection was, however, a problem throughout the entire war, and had already been identified during the Polish invasion. Although the thickness of the Panzer IV's armour gradually increased, the basic structure set limits that couldn't be circumvented without serious problems to reliability or mobility. The armour fulfilled the minimum requirement for a tank's protection, but no more.

"IN MANY WAYS, THE PANZER IV WAS THE FIRST MODERN TANK"


A Panzer IV F1 in the Battle of the Kasserine Pass in North Africa in 1943. The tank had technical problems in the desert because sand got into the engine.

ULLSTEIN/IBL

Ground pressure was equal to other similar or superior tanks during the war – only the Soviet KV-1 and T-34/76 were noticeably better. When it came to the ratio of engine power over weight, the Panzer-IV compared favourably to most other Allied tanks. Heavy infantry tanks such as the French Char B1 bis and the British Churchill were inferior. The Panzer IV was equivalent to the Soviet KV-1 and JS-2 models, but worse than the T-34. When it came to mobility, the tank received a pass.

IN MANY WAYS, Panzer IV was the first modern tank. Several technologies found in modern tanks can be traced back to its advanced features. The Panzer IV probably had some deficiencies in its construction, but the fact that it was the only tank in the European battlefields to be in service on the first and last day of the war says something about its future-proofed design. It was the German tank that was produced in the greatest number: 8,500 units, a third of tanks produced the during. It really was the workshop of the German panzer divisions. ★

Harald Sonesson is a reserve tank officer specialising in combat tanks.

General never

Patton in the Tunisian Desert in 1943: in his holster is an ivory-handled Colt Peacemaker – part of the legendary general's iconic trademarks.

ELIOT ELISOFON/THE LIFE PICTURE COLLECTION/GETTY

gave up

Columns were important to an old cavalry officer like George Patton. He viewed tanks as the **future of cavalry**, and believed he was superior to armoured opponents like Rommel and Guderian.

Text: **TORBJÖRN KVIST**

Mexico 1916. The Pancho Villa Expedition saw the first US armoured force in history – three Dodge touring cars and ten men from the 6th Infantry – sent on a raid. By its end, General Julio Cardenas, head of Pancho Villa's bodyguards had been killed and his body – along with two others – strapped to the hood of the car. The force's commander had been taken from the 8th Cavalry Regiment, an easy-going lieutenant with a high-pitched, nasal voice and the nickname *"Old Blood and Guts"* He was George Smith Patton Jr.

By mid-December 1944, the US Third Army stood in front of Westphalia in Germany on the Saar river. Even as a harsh winter approached, they'd finally cleared out the old fortified city of Metz: an exceptionally hard nut to crack, as it had been during all the previous actions that had taken place through the Moselle Valley.

The Third Army had slowed its advance, largely because the Allies appeared to have lost momentum ahead of the push into Westphalia and across the Rhine, the last obstacles separating them from the German lowlands and Berlin.

General Patton, the Third Army's already legendary commander, was worried. His staff could see his agitation as he stood over the map table; they could also see Colonel Oscar W Koch, intelligence officer, biting his lip as he delivered his status report.

Koch, comparing his own intelligence with that of Courtney Hodges' 1st Army in the North and Omar Bradley's 12th Army group further behind, identified two German assembly areas as far north as Düsseldorf. This confirmed what the German-born colonel had suspected over three weeks earlier – that almost all German armoured forces had been moved away from the section between Thionville in the north and Saint Avold in the south.

By 23rd November, Koch had detected the formation of a new German 6th Panzer Army at Aachen; on 2nd December, the feared Panzer-Lehr Division was reported as 'vanished' and on 5th December, he could inform the staff of the First Army that he'd identified nine new German ▶

divisions ahead of the US VIII Corps. The latter had arrived in the Ardennes in early October after fighting in Brittany, in an area believed quiet enough to be used for orientation and rest.

Patton put his reading glasses down on the map and straightened up, his head towering over the others at the table. Colonel Koch crossed his arms and chief of staff Brigadier General Hobart 'Hap' Gay knew what his commander was thinking: 'Bradley and Hodges are fools'.

Since June, when the Allies had successfully trapped the Germans in the Falaise Pocket – made possible by Patton's rapid advance – they'd become complacent towards the Wehrmacht in light of its continued withdrawal through France and Belgium.

The general Allied strategy of advancing on a broad front, which Patton hated as much as his rival Field Marshal Bernard Montgomery, had further enhanced the illusion within the Allied camp that they only had to kick the door down to Westphalia and Germany would collapse like a house of cards. Patton didn't buy this 'fool's story', unlike his old friend Dwight D Eisenhower, and he cursed Bradley.

Patton insisted that the Germans would turn and go on the counteroffensive before Westphalia, and that they had no choice if the Rhine couldn't provide them with a barrier, but his argument fell on deaf ears. Patton said that he felt like the Confederate general James Longstreet, General Robert E Lee's deputy before the battle of Gettysburg. Longstreet was astute enough to see what would happen, but was unable to convince anyone else.

The Germans' outstanding leadership fascinated him – their impressive ability to constantly recover showed that they were not yet beaten. They were still fighting on the Eastern Front and could strike back whenever they wanted. That the German soldier still trusted in his commanders rang alarm bells for a leader like Patton.

After Montgomery's unsuccessful Operation Market Garden in the Netherlands in September 1944 failed to open the eyes of Bradley and the others, what was going to happen next? Suddenly an SS Panzer Corps had appeared in Arnhem, which had led to a bloodbath among British paratroopers – Panther tanks against machine guns. Patton shook his head and left the table as his chief of staff watched. During the autumn, they'd secretly made plans in case the Germans had embarked on something major to the north-east of the Third Army's field of operations – for example, something similar to German Field Marshal Erich von Manstein's *Fall Gelb* when Germany invaded France through the Ardennes back in 1940.

Patton was the only army commander who received information from the Ultra – the British intelligence service. Ultra probably played an important role in Patton's relationship with his intelligence officer. He and Koch were the perfect couple: Koch's diligence and care balanced by Patton's toughness and instincts. Gay could never have imagined he would find himself alongside Patton a year later, his arm in a sling, despairing as he watched the old general face death after a serious car accident.

Patton at the Virginia Military Institute where he graduated in 1907.

General George S Patton Jr died aged 60 in Heidelberg, Germany, on 21st December 1945. The official diagnosis was pulmonary edema and congestive heart failure after the severe trauma of his car crash. He was buried – according to his own wishes – in Hamm in Luxembourg City.

After he died, his reputation was slowly taken apart. Patton's autobiography, *War as I Knew It*, was quickly overshadowed by more current and sought-after works, written by well-known former generals such as President Dwight D Eisenhower and former Foreign Minister and Defence Minister George Marshall. None had any interest in digging too deeply into their wartime memories for Patton's sake, so Omar Bradley's version of history stood.

Bradley held a grudge against Patton, which probably began back in Sicily in 1943 when he bore the brunt of pressure and criticism as commander of II Corps, providing support for the flank of Patton's advancing Seventh Army. Bradley was technical advisor during the recording of Franklin J Schaffner's film *Patton* in 1970 with George C Scott in the title role. The film was partly based on Bradley's autobiography, *A Soldier's Story*, and influenced the overall perception of Patton as a despotic warrior.

It wasn't until the end of the 20th century that an alternative image of the old general was presented, and in the 2000s it was decided to republish his autobiography. That said, regardless of what people thought of Patton's reputation, it was always difficult to downplay his military genius.

In the 1930s, at least 75 percent of the world's military literature was written by Germans and Patton had read it all, especially the tactics and theories expounded by Heinz Guderian. He felt quite confident when he stood, hands on his hips, on the banks of the Red River in 1941. He wore a red ribbon around his helmet, which also glittered with two stars. They were making a manoeuvre in which they would carry tanks from General Patton's 2nd Armored Division over the river.

The Japanese had not yet attacked Pearl Harbor, but Congress had given the green light for holding military manoeuvres in the southern United States in the summer of 1941 – the largest the country had ever held. A total of 500,000 men participated, most from the existing regular army, but also members of the National Guard from half a dozen states.

It was a huge undertaking and hundreds died, but it was where the US Army tested its fighting doctrine before the war that everyone was convinced was coming. The US had studied the German blitzkrieg in depth and the army that was now being trained was completely different from just a few years earlier. All-new equipment was tested: the M1 Garand semi-automatic rifle, the characteristic round US Army helmet and various M4 Sherman tank prototypes. The key figures who lined up to lead US troops in the war were Dwight Eisenhower, Courtney Hodges, Lucian Truscott, Omar Bradley, Mark Clark, Troy Middleton, and "Georgie" Patton, who emerged as the big star from the exercises.

Patton was born in 1885 in California, but the family originated from Virginia, just like the Confederacy generals Robert E Lee and Stonewall Jackson. His grandfather, Colonel George S Patton, fought and died in the Civil War, and while his son left for California, his grandson always carried a torch for the area. Patton thrived in the south during the war games. His showy appearance was only bettered by his performance in the field, impressing high command.

Patton was generous with the praise showered on him, happy to share the glory through commendations for his officers and men. He was also keen to be popular among fellow officers. He was ten years older than most, and his fear of being left behind was obvious. He should have been considering retirement with only his charm and experience to save him.

The 'Louisiana Maneuvers' were a great success for Patton. His armoured division seemed to be everywhere at once, and many generals expressed frustration in their field reports over what they considered as irregular manoeuvres from "this Patton". It was here, in the deep American South, that Patton taught his colleagues the principles of blitzkrieg.

Patton was neither afraid of Rommel nor Guderian. He gladly pointed out to those who would listen that he had more experience with armoured troops than any German general. When German officers were fighting among the infantry on the Western Front during World War I, the young Major Patton had led his own tanks battalion in the war's final phases. He could barely contain himself – he simply wanted to cross the ocean and take on the German panzer generals.

George S Patton had a favourite expression: there was "no such thing as 'Tank country' in a restrictive sense. Some types of country are better than others, but tanks have and can operate anywhere." It summed up the de facto military doctrine that has always ruled US warfare: "take the fight to the enemy", in other words, go on the offensive.

US ARMY SIGNAL CORPS

During World War I, Patton quickly rose through the ranks. Picture from the summer of 1918 when he was acting colonel, with a six-tonne Renault FT M1917 light tank.

"The Germans' outstanding leadership fascinated him – their impressive ability to constantly recover"

Patton was the most American of all the generals. He was schooled in the US Army's rationale, honed over 200 years of repeated upheaval followed by disarmament, caused by the political machinations of a Congress that never trusted the army to be truly independent of the White House's aspirations. Patton was the product of this constant rebirth of ideas where theories rarely enjoyed any kind of longevity.

The US Civil War was history's first modern war for one reason. The insignificant US Army Adjutant General's Corps was replenished with new reserve officers, which inevitably led to new thinking and approaches. Similar developments had hardly been seen in Europe, where the agenda was set by a combination of nobility and general staff whose jobs were for life.

Patton was raised in the American spirit and he remained a very modern military man, despite his classicism, his grandiose appearance and ▶

▶ his age. He was a man of his time and one who seriously believed he'd been reincarnated from a Roman legionary.

When the US joined World War II and its troops began to flood into Britain, they were received with open arms. But there were also misgivings: US doctrine demanded they invade the European continent sooner rather than later – preferably during 1943. 'We are prepared for it', they said, 'and we mean business'.

The British protested. The reality of war was very different – as demonstrated by the disastrous raid on Dieppe in August 1942 – and what about her colonial interests in North Africa and the Middle East? Although it was never voiced publicly, the Americans never quite understood why they should detour through Africa and Italy.

Therefore Patton made his entrance on the scene in Morocco as the first operational US general, but was forced to remain in Casablanca while the hapless Major General Lloyd Fredendall was selected to lead the US II Corps into Tunisia and the Kasserine Pass. But he needn't have worried. It was totally inconceivable that the chief of staff in Washington, General George Marshall or Eisenhower, commander of the Allied forces in Europe, would not make use of him.

NARA

Patton in conversation with Colonel Lyle Bernard from the 30th Infantry Regiment, near Brolo in Sicily in August 1943.

In the autumn of 1944, every battalion commander in Patton's Third Army learned that the old man might storm into the staff tent at any time, staring at their maps before changing positions of a company here, a neighbouring battalion there. They were constantly kept on their toes. Provoked by the miserable supply situation due to the Allies' failure to secure enough ports in Western Europe coupled with the broad-front strategy, Patton had developed this strategy to perfection.

He used active reconnaissance, with unshaven partisans and unauthorised units who took full advantage of the smallest gaps in the hard-pressed German lines. Patton's rogue reconnaissance units launched more large-scale attacks than anyone else on the Western Front. When this happened, Bradley could not do anything other than give Patton extra resources.

Early on 16th December, 1944, the Germans caught the Allies napping with Hitler's biggest ever counterattack in the west. *Unternehmen Wacht am Rhein* ("Operation Watch on the Rhine"), comprising 250,000 men, 1,800 tanks and 2,000 artillery guns, appeared apparently out of thin air.

> "He could barely contain himself – he simply wanted to cross the ocean and take on the German panzer generals"

Three days later, Patton drove his Jeep from Verdun to set up a forward command post in Luxembourg. He'd just come from a remarkable staff meeting at the headquarters of Walter Bedell Smith, Eisenhower's chief-of-staff. Almost everyone had been there and Eisenhower had uncharacteristically lost his temper.

Eisenhower demanded to know how German troops had been allowed to overrun VIII Corps and the rest of the First Army with just two panzer armies. Why on earth had this not been discovered in time? Omar Bradley was red in the face: the criticism was, albeit indirectly, aimed at him.

The Ardennes Counteroffensive proved to be the biggest disaster for the US during the war. Over three short weeks messages informing of 20,000 deaths were sent home to the United States. Patton had announced that he could launch a counterattack from the south with three divisions on the morning of 23rd December just four days later – its purpose to liberate Bastogne, where two regiments from the 101st Airborne Division had been surrounded. Everyone in the room stared at him. Bradley protested, but was stopped by Eisenhower who approved the proposal.

One day later, on 20th December, Eisenhower took direct command and placed all US troops north of a line between Bastogne and St Vith under Montgomery's British 21st Army Group. This left Patton in sole charge of the operation area to the south, effectively cutting off Bradley from his command. He was reduced to no more than a general quartermaster. For a while, Bradley thought his friends had betrayed him, especially Patton. Not even promotion to four-star general immediately afterwards would remedy his disappointment.

Bradley's doubts during the staff meeting were nevertheless quite legitimate. On 18th December he had commanded Patton to share responsibility for protecting the flanks – but Patton completely flouted the order. Most of his armies were busy thinking about how they would break through Westphalia and cross the Saar River.

To Bradley, it appeared Patton lacked sufficient reserves. When Patton told him that he would use the 4th Armored Division as well as the 26th and 80th Infantry Divisions, however, everyone in the room gasped. Bradley pointed out that these units in the south would be forced to pass through the Third Army in just four days. Patton replied that he was aware of this, but that it had been accounted for. It was obvious that he was a few steps ahead of everyone else.

When Eisenhower left Verdun that day, he was confident that "Georgie" would take care of the matter. Patton didn't dither as he hobbled into his jeep. An alert had already been passed to the Third Army's chief-of-staff, General Gay, before his departure that morning. Now he checked through the entire operation in detail, via radio, and inside his own head.

The reorganisation carried out by the Third Army in the days before Christmas 1944 in a snowbound northern France has entered military history as perhaps the best ever. The logistical challenge was huge and the burden on the staff and various departments required almost superhuman strength. Three divisions of Patton's own 4th Armored Division formed a column nearly five kilometres long on a country road, bumper to bumper. It involved a relocation of over 50 kilometres, with a total of over 15,000 vehicles and 55,000 men who had to drive through an army that was in combat 24 hours a day.

All status reports had to tally. Hundreds of tanks would be in service, or there would have to be replacements in the right places, soldiers had to be provisioned and traffic could not get stuck. During these days General Gay's staff, under Patton's direct supervision, moved about 63,000 tonnes of equipment, including an average 4,500 tonnes of ammunition per day. Hundreds of thousands of new maps with a combined weight of 57 tonnes were distributed, 725 kilometres of routes were completed and over 5,000 kilometres of telephone cables were laid. Patton wrote later: "The most brilliant operation we have thus far performed, and it is in my opinion the outstanding achievement of the war. This is my biggest battle."

At 06.00 on 22nd December 1944, a whole day before schedule, the front units of the US 4th Armored Division stood along two parallel roads in the dark and snowy forests at the border with Luxembourg. They had support from 108 artillery battalions, and around 1,300 guns opened fire in unison as soon as the order to advance was given. It meant a young sergeant could not hear the tanks in line starting one by one as he sat huddled in the turret of his Sherman tank. He was the fourth tank from the front and did not see what was happening until he caught a movement from the corner of his eye.

It was a half-track that slowed with a jerk and the sergeant was about to bend down and command "drive" when he spotted the man in the vehicle. He stood like a Roman centurion with his fur jacket, fur collar up and a polished helmet on his head. Binoculars hung around his neck, and when he turned and nodded at him, the sergeant saw the three stars on his helmet. It was Patton; the old man had the habit of joining the fourth tank when they attacked.

Patton felt at home in northern France in its familiar landscape where he had previously ridden in 1918. It had become a diminishing privilege for a classic cavalry officer like him. something that became more of a hobby after his old commander and mentor, General John 'Black Jack' Pershing gave him the confidence to lead America's first and only armoured brigade in WWI.

He'd put the horse in the stable and turned the tank into his passion. But only on the outside, because in Patton's world the tank was the new cavalry, as it had always been: independent, fast, penetrating and dominant, just as he was. And now the fate, by which he lived so strictly, led him to this moment, the greatest he would ever experience in his life.

Torbjörn Kvist is freelance writer and film and television producer.

Further reading:
War as I Knew It (1947) by George Patton (diaries).
★ **Patton – A Genius for War** (1995) by Carlo D'Este.
★ **Patton on Leadership** (2001) by Alan Axelrod.

EVERETT/IBL

General Patton points out the direction US troops should follow in Sicily. 11th July, 1943.

Along with the Italian governor of Libya, General Italo Gariboldi, Rommel rallies his troops before they go up against the Allies.

AFRIKA KORPS SAVED ITALIANS

In February 1941, as the German General Erwin Rommel and his Afrika Korps (DAK) arrived at Tripoli in Libya, they were met by an exhausted and dejected Italian army. Luckily, the port city was still in Axis hands. Rommel's cure for the low morale was an offensive that would soon make him the Allies' worst enemy.

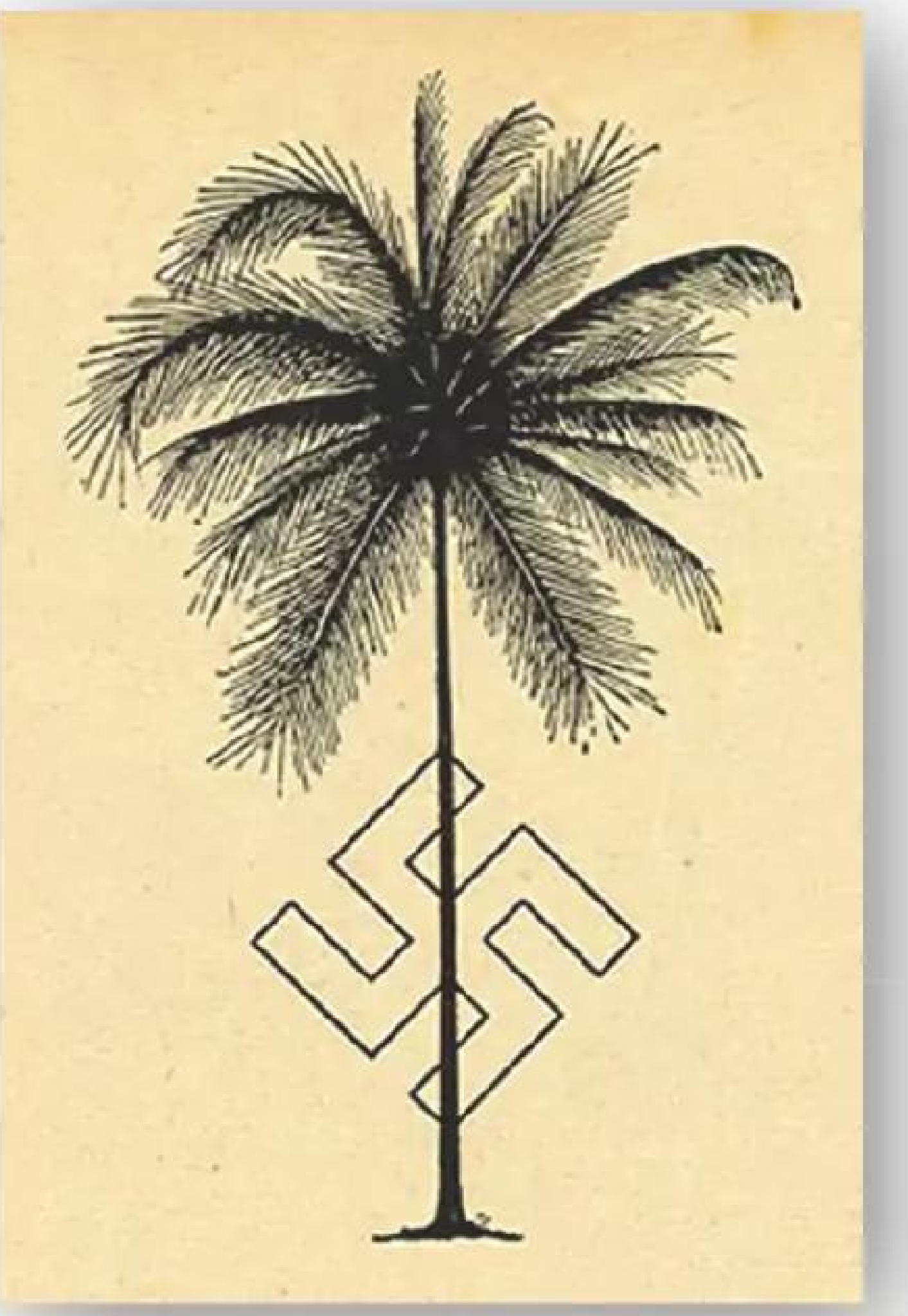
In Europe, the Axis roared forward and one country after another fell to Hitler's Blitzkrieg. In North Africa it went the opposite way. Here Hitler's allies, the Italians, were under attack and fiercely resisted, and soon they were in retreat. Before the Italians lost their foothold in Africa, they needed help quickly from the Germans.

LIBYA
EGYPT

Tripoli was in the spotlight as tanks, sand-coloured and discreetly decorated with a palm overlaid with a swastika, rolled out from the German ships. Unloading lasted all night, but the next day at 11.00 all was ready. The soldiers at the core of Nazi Germany's new Afrika Korps were running to parade. Erwin Rommel, the corps newly appointed leader, made a speech. To inspire his men's fighting spirit he promised them a great adventure.

"We have just begun what will be an amazing safari", he said.

"Heia Safari" exclaimed a young soldier spontaneously. His comrades repeated the words that became the Afrika Korps' battle cry.

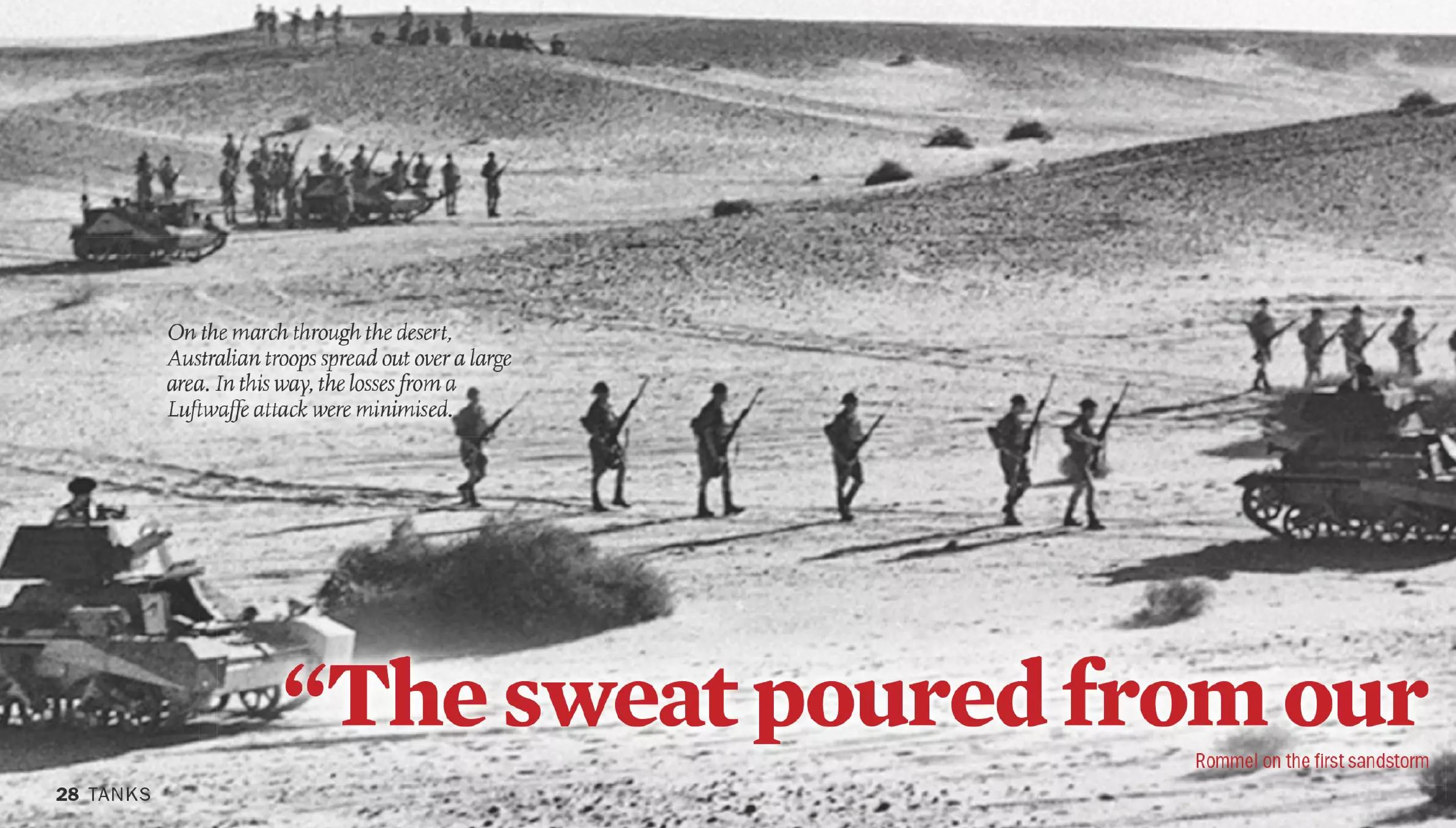


The Afrika Korp's logo was a palm tree with a swastika superimposed on the trunk.

The men in the corps, set up by Hitler a short time before, needed all the fighting spirit they could muster. While the Wehrmacht rolled almost unhindered through Europe, the Axis powers were in retreat in North Africa. The Italian dictator Benito Mussolini was Hitler's ally and responsible for the war here, but the Italian force's strength and morale left a lot to be desired. Italy's army was the worst in Europe.

Most of their weapons were from WWI. The tanks were almost useless – and the soldiers called them "self-propelled coffins". Vehicles were in short supply. Instead, the soldiers had to march – a significant handicap in the desert, where not only victory, but also an individual's survival depended on being able to move freely.

The result was that the Italians were repeatedly overtaken and caught by the British, who had a good supply of vehicles.



On the march through the desert, Australian troops spread out over a large area. In this way, the losses from a Luftwaffe attack were minimised.

"The sweat poured from our

Rommel on the first sandstorm

In early February 1941, the Italians lost the important Libyan cities of Sollum, Benghazi and Tobruk. Tripoli only remained in Axis hands because earlier that year, the British had pulled troops out to counter a German offensive in the Balkans. The Axis's victory campaign was mired in the desert sand.

Italians were on the verge of breakdown

Hitler had no choice but to send German troops to North Africa. An offensive blitzkrieg with tanks and air power, as the Germans had used in Europe, would turn the fortunes of war. For this purpose he set up a new unit, the Deutsches Afrika Korps (DAK), which was centred around two tank regiments, supported by infantry and air squadrons.

The head of the corps was 49-year-old Erwin Rommel, who besides being a loyal support of Hitler and a capable military theorist, had also distinguished himself as a brave and enterprising leader of the 7th Armoured Division during the invasion of France. Rommel was known to never shy away from an attack and not to fear the enemy. He would make good use of both traits in North Africa. Upon arrival on 12th February, Rommel's first impression shocked him. Beaten Italian troops arrived in Tripoli on foot, limping and exhausted. Despair was etched all over their faces.

“Morale was as low as it could be”, Rommel wrote later. Should the Allies choose to strike against Tripoli, nothing could stop them, he confided to Hitler's adjutant, Major General Schmundt. “There is only one way to stop this nonsense, and that is to go on the offensive”, he told Schmundt on the way to the Führer's headquarters.

Rommel began preparing his forces immediately. The goal was to reach Egypt, occupy the strategically important Suez Canal and then continue to the Persian Gulf with its rich oil▸

1889-1959

NAME **LESLIE MORSHEAD**

TITLE AUSTRALIAN LIEUTENANT

Held Tobruk during the siege

Until October 1941, Morshead held the Allied garrison at Tobruk against Rommel's siege. Morshead was General during WWI. After the war, he worked for a civilian shipping company, but when WWII broke out, he went back into uniform. Morshead demanded discipline and was nicknamed “Ming the Merciless” after the mad emperor in *Flash Gordon* – the name, however, was not meant unkindly.

- **Trained as a schoolteacher.**
- **Served in Borneo and New Guinea.**

1893-1969

NAME **RONALD SCOBIE**

TITLE BRIGADIER

Declared the breakout from Tobruk

British General Ronald Scobie succeeded Morshead as commander in Tobruk and participated in the offensive against Rommel in November. Scobie was born in Mandalay in Burma, then a British colony. He was inducted into the Royal Engineers in 1914 and rose quickly through the ranks. At the outbreak of WWII he was a brigadier general and was deputy director of the British War Office, which administered the army.

- **Former high level rugby player.**
- **Commander of the 70th Division.**

bodies in the unbearable heat”

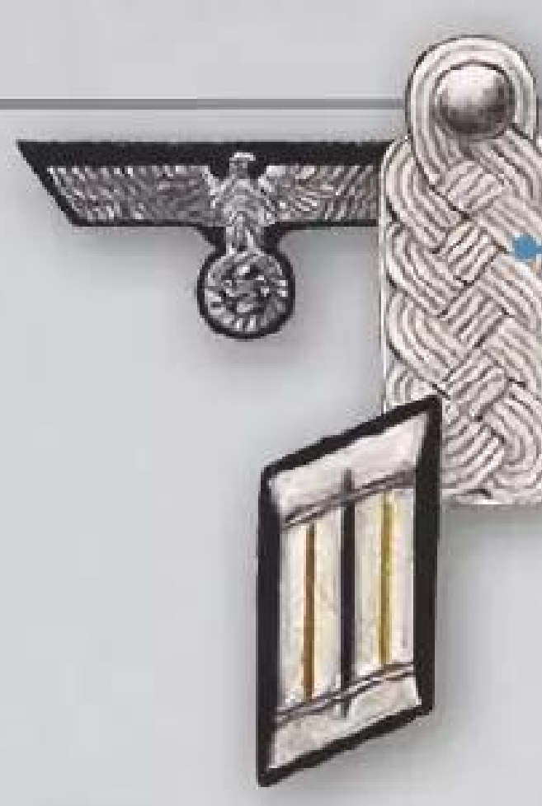
he experienced in North Africa.

UNIFORMS

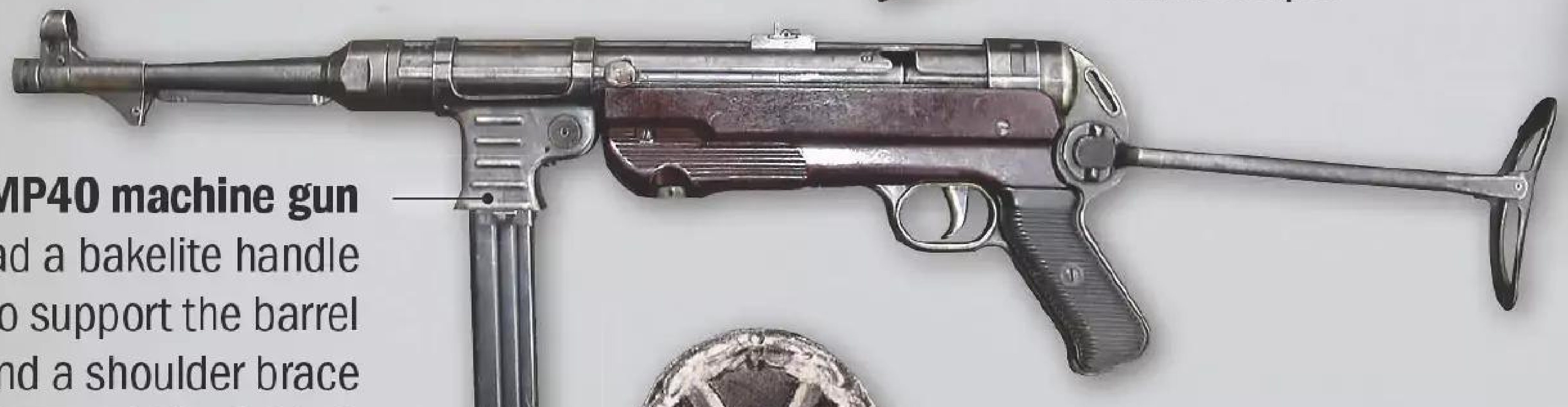
Desert uniform was basic

The Afrika Korps wore a customised version of the Wehrmacht standard uniform, with lighter fabric and shorts.

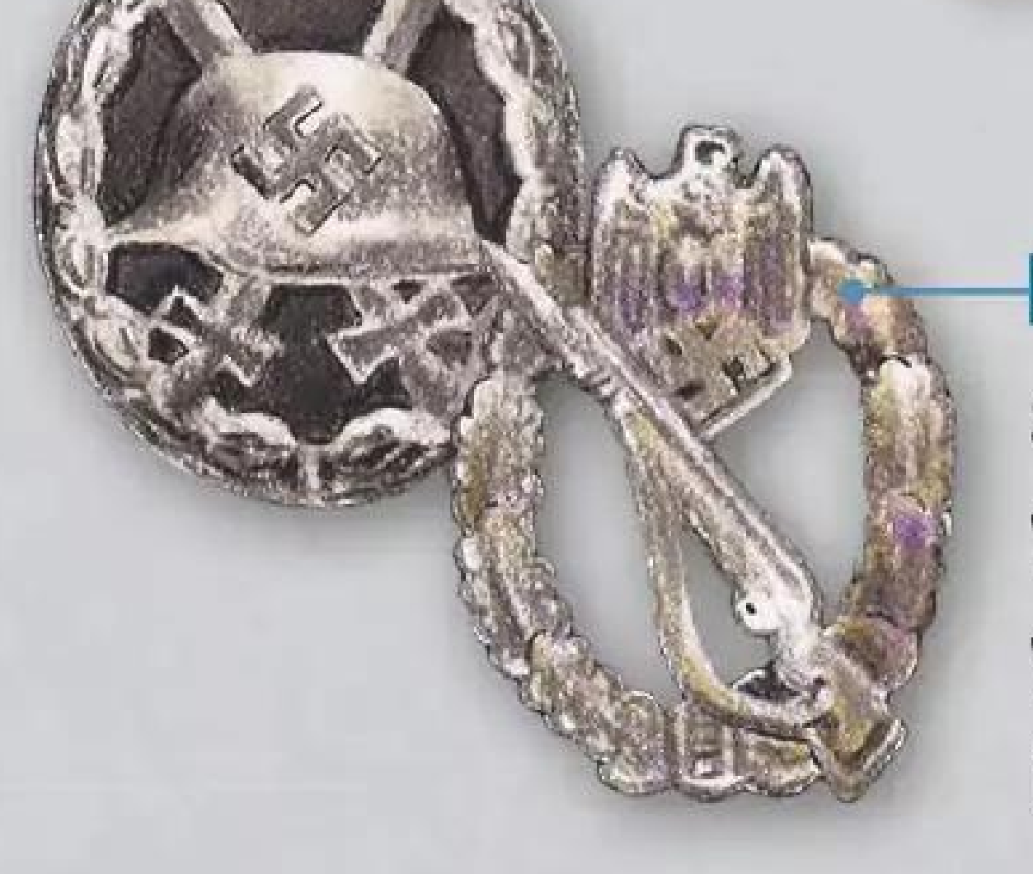
On the way to Tripoli, German soldiers changed their uniforms to ones designed for the hot climate. The men and officers had similar equipment.



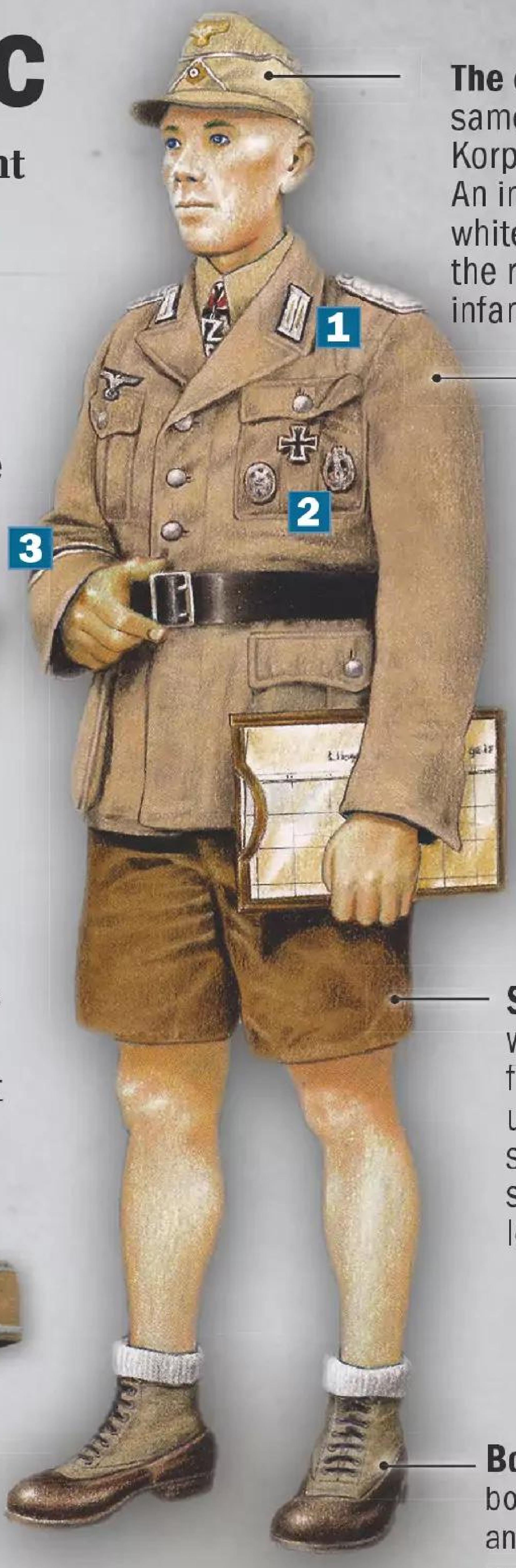
1 **Stripes** on shoulder, collar and the right pocket showed that the man was an officer in the Afrika Korps.



MP40 machine gun had a bakelite handle to support the barrel and a shoulder brace that could be folded.



2 **The helmet emblem** showed if the soldier was wounded and a mark with the rifle showed that he was an infantryman.



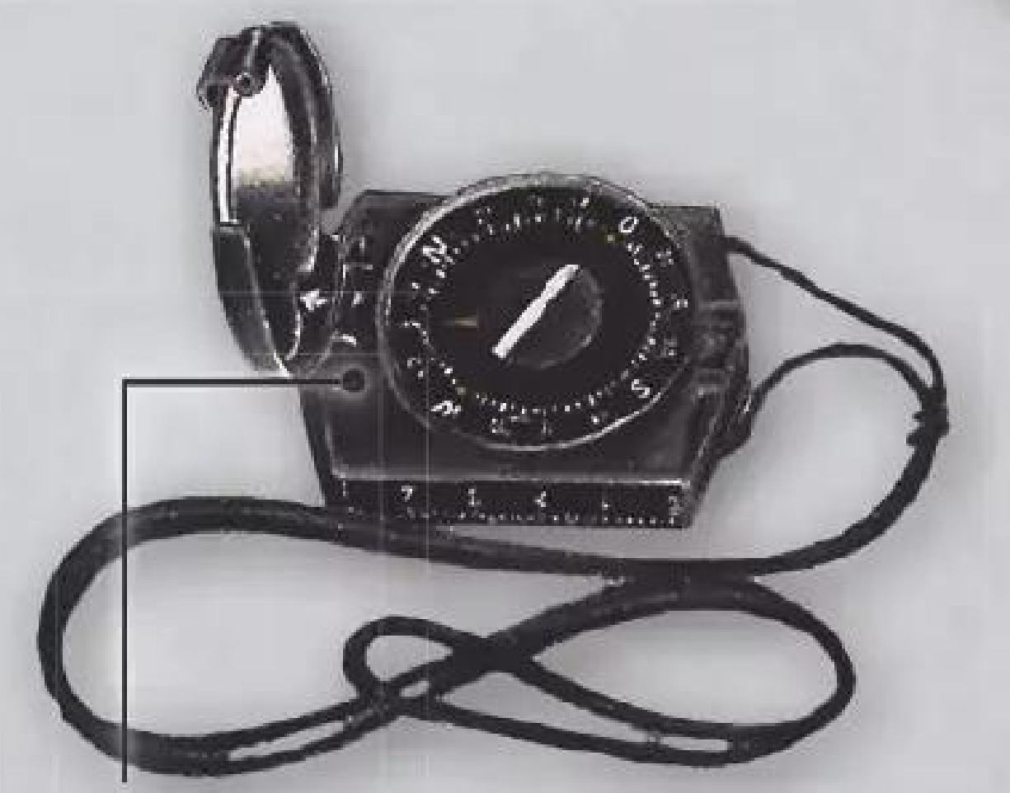
The cap was the same for all Korps soldiers. An inverted white V indicated the rank of the infantry officer.

The jacket was a light olive green cotton that faded quickly in the hot desert sun.

Shorts were worn in the field. In urban situations soldiers wore long trousers.

Boots were both leather and canvas, specially made for desert use.

Binoculars were light grey bakelite to better fit in with the colours of the desert.



Compass was a life-saver in the desert where the landscape was hard to make sense of.

3 **An arm band** with the korps name was worn on the uniform-jacket's right sleeve.

sources. But the desert offered severe resistance from the beginning. "Great clouds of reddish dust made visibility poor... Often the wind was so strong that it was impossible to drive along the Via Balbo (main coastal road). Sand streamed down the windshield as if it were water. We gasped for breath through handkerchiefs as we covered out faces, while the sweat poured from our bodies in the unbearable heat", wrote Rommel about the sandstorms he saw on his first days in North Africa.

Despite these ordeals, the general attacked the enemy. In small targeted operations he attacked the smaller Allied forces. It went well. After running 800 km through the desert, DAK took the port city of Benghazi on 3rd April, an important stronghold on the road to Egypt.

The Germans and Italians were equally as amazed as the Allies, whose intelligence services – correctly – announced that Hitler would not approve a major attack before the Afrika Korps had enough men and vehicles. Rommel had acted against Hitler's orders.

"I took the risk against all orders and instructions because the opportunity seemed favourable. No doubt it will all be pronounced good later and they'll all say they'd have done exactly the same in my place", Rommel wrote in a letter to his wife, Lucia, on the same day. "You will understand that I can't sleep for happiness", he added. Only Tobruk, a port city further up the coast, stood between him and Egypt.

A wide-brimmed canvas helmet with air holes on top protected against the sun.

SANDSTORM DELAYED ATTACK ON TOBRUK

Tobruk itself was not remarkable, just a collection of scattered houses surrounded by dusty palm trees. However, the city was of great strategic importance. In addition to being the site of the area's best port – the only deep sea port between Tripoli and Alexandria – the city was also a great base for forces that could block the enemy's route to Egypt.

If the Germans could occupy Tobruk, they would save a journey of several hundred kilometres the nearest port, and the route would be open to Egypt. Rommel immediately decided to launch an assault on the city, where the Allies he'd sent on the run had gathered following the attack on Benghazi. With luck, he'd arrive before the British and fortify the city. The British, however, were as equally determined to defend Tobruk as the Germans were to take the city.

The city must be defended "to death without thought of retreat", Churchill ordered General Archibald Wavell, commander of the British forces in the Middle East. On 9th April, the Australian Major General Leslie Morshead arrived with his 9th Division, a force consisting of six infantry brigades, four artillery regiments, two anti-combat vehicle regiments, 42 tanks and 36,000 men.

The formidable Australian Army did not scare Rommel, who sent his men on the offensive the same day. The attack would take place with three units. One would attack from the west and one from the south, while a third would take direct action against the fortress' centre. The attack never materialised: a fierce sandstorm like the one Rommel had experienced a few months earlier delayed the group that would attack the southeast. On 11th April, Rommel's forces managed to circle the fort. Rommel was an optimist. "Once Tobruk has fallen, which I hope will be in ten days or a fortnight, the situation here will be secure.", he wrote to his wife on 23rd April. It wasn't to be that simple.

Despite several attempted attacks, the Allies held their positions. After fierce fighting on 3rd-4th May, when 650 Germans and 500 Italians were killed and the Germans had only gained a few metres, the general realised that the siege would be both lengthy and painful; neither party could have imagined that the ordeal would last 221 days, however.

Supply vessels were blown up

The German siege made it impossible for the Allies to receive supplies by land. With his Stuka dive-bombers Rommel hoped to further isolate the British. "Water is very short in Tobruk, the British troops are getting only half a litre [a day]. With our dive-bombers I'm hoping to cut their ration still further.", he wrote in his diary. But Rommel and his forces suffered from a lack of water too: "The heat is getting worse every day and it's a relief when night comes. One's thirst becomes almost unquenchable".

Equally serious was the Afrika Korp's lack of military equipment. Few Italian ships arrived. The vast majority were blown up on the journey over the Mediterranean. The situation was becoming disastrous for the Axis, who only received 29,000 of the required 50,000 tons of arms, ammunition

►

Unlike the British, the Italian army had few vehicles. Soldiers marched in heat and desert dust.

The small Italian tanks were thinly armoured – the soldiers called them "self-propelled coffins".

Mussolini's forces were ousted from Africa

Despite superior numbers of almost 10 to one, Italian forces fought badly in Africa. At every turn their campaigns were thwarted by the Allies.

As the Italians began a series of military campaigns in Africa in 1940, Benito Mussolini had the greater number of troops. In Egypt they had 236,000 men, while Britain only could muster 36,000 out of a total 100,000-strong Middle Eastern Force. Italy's army, however, was scattered and their equipment was too small, for them to catch the British: with their obsolete weapons and tanks with thin armour that the British could easily shoot through, the Italian's plans failed.

Also in East Africa, where the Italians used the colonies Eritrea, Somaliland and Ethiopia as a springboard for military campaigns, things went wrong, despite a large number of Italians and native forces. Invasions of Kenya and Sudan both ended in crushing defeat.

Only the invasion of British Somaliland in August 1940 was an immediate success. After a short series of strikes, the British and their allies evacuated the area finding refuge in Yemen. Two Sikh divisions recaptured Somaliland and it was handed back to the British in 1941.

"I took the risk against all orders"

Rommel in a letter to his wife, Lucia on 3rd April, 1941.

and food. The Allies sent a steady stream of supplies to the port of Tobruk courtesy of the Royal Navy. In May, less than 84,000 tons of supplies arrived and a fleet totalling 16,000 troops and 238 tanks landed at various quays.

On 15th June, the Allies had enough tanks, planes and men to launch a major offensive against the Germans. With Operation Battleaxe, the Allies would relieve Tobruk, recapture the Halfaya Pass on the border with Egypt and take back control from the Axis. They would get a shock.

As British tanks drove into the Halfaya Pass on 16th June, they walked straight into a trap. A battery of powerful 88-mm guns, dug into the sand, opened fire on them. All but a single tank was lost. Other tanks heading towards Hafid Ridge, another strategically important spot, were greeted by popping anti-tank fire. By noon, three-quarters of the 238 new British tanks were out of action.

General Wavell ordered a withdrawal. Along the way, the Germans managed to seize most of the British tanks, which had not been destroyed. Churchill was so enraged by the losses that he removed Wavell from the post of commander in chief and replaced him with Claude Auchinleck. Rommel was quite satisfied. "The three-day battle ended in a complete victory. I'll go around my troops today and thank them", he wrote to Lucia on 18th June.

Luftwaffe bombers supported Rommel's tank divisions. The tactics were the same as the Blitzkrieg in Europe.

British would kill Rommel

"Rommel's name and legend is about to pose a psychological problem for the British Army," one intelligence source noted in summer 1941. Shortly after Operation Battleaxe, the British intelligence service were sent to assassinate the general – the first time was in his headquarters west of Tobruk, where the assassins were only a few metres from Rommel's truck.

The second time, British agents were on the beach when Rommel swam in the sea off his new headquarters in Badia, but the general managed to dive behind some large rocks. "I must be worth a great deal to the English", he remarked laughing to his adjutant.

Yet Rommel had not been able to use his psychological advantage. The Axis had major problems with supplies and the situation became progressively worse.

On the night of 8th November, the British warships sank an Italian-accompanied convoy with 39,000 tons of supplies.

The lost cargo equalled the total supplies that reached Rommel in September and October. In mid-November Rommel had less than 15 per cent of the ammunition and fuel he needed. With his own fighting force shrinking and the Allies' rising, Rommel was convinced that the enemy was preparing an offensive and he wanted to strike first. Hitler, along with the High Command and the dictator's close military advisor Lieutenant General Alfred Jodl, was adamant – only in January 1942 when the Afrika Korps had increased its combat power, would an attack be countenanced.

In the meantime, when Rommel received a set of aerial photos from the Luftwaffe that showed that the British were in full swing building railways for transport across Egypt, he exploded with frustration. "I do not want to look at it!" he yelled as he threw the pictures on the floor. Shortly afterwards he was on a plane to Europe. From Rome, he called Jodl, who surrendered to his demands on the condition that the attack would not destroy the German forces. The date of the attack was set for 23rd November.

Members of the Afrika Korps had heavy signet rings with the corps logo.

AFRIKA KORPS PASSED THE TEST

British intelligence had got hold of a map of German positions, drawn by Rommel himself. With that, they could strike before the Germans. The Allied attack on 18th November, the same day as the worst storm in 60 years, reached the area around Tobruk. Tents were torn down by the wind, and trucks and guns overturned and buried in the sandy water. Mudslides and small sand avalanches triggered explosives in the mine fields that should have protected the Germans. Rommel, who had just come back from Italy, wrote to his wife on 20th November: "The enemy offensive began immediately after my arrival. The battle has now reached its critical point. I hope we get through it in good shape".

The attack culminated in a four-day battle at the town of Sidi Rezegh where Rommel's armoured forces clashed with the British. The British were far superior to the Germans in strength. Yet Rommel secured a tactical victory that cost the British Army greatly. The British lost 530 tanks in the battle, while the Axis only lost 100. Despite this, Rommel could not take Tobruk. While the Brits received supplies, Rommel's forces lacked everything. Famished and tired, the German forces had to withdraw.

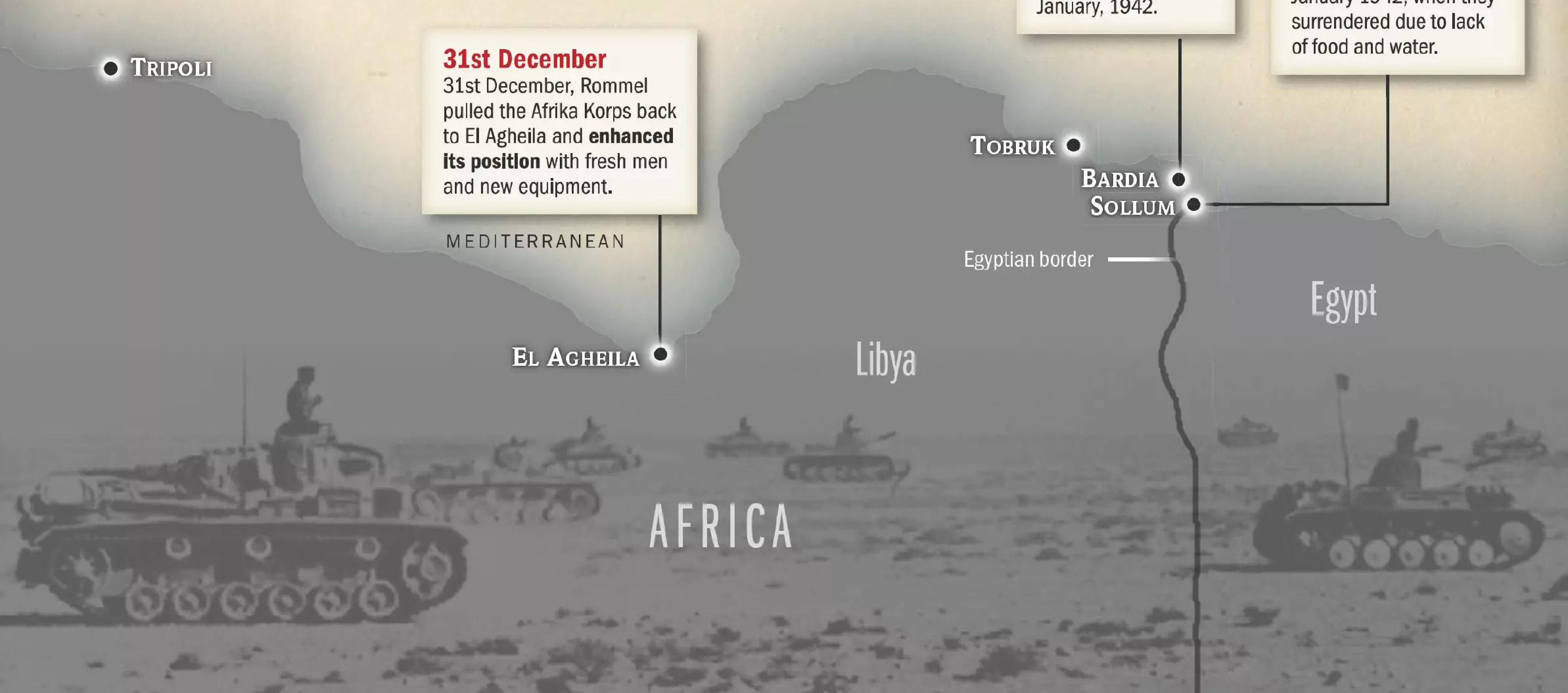
The retreat was only temporary. DAK had passed the test, and the following year Rommel would return to target Tobruk once again. ✪

PERSPECTIVE

The year ended in retreat

Late in the year the Afrika Korps had to abandon the siege of Tobruk and retreat to a position where they could gather strength and receive supplies before a new offensive.

After Rommel's success during 1941 when DAK stormed through Libya, besieged Tobruk and threatened the Egyptian border, British General Wavell was replaced with General Auchinleck. Later in the year, there was an indication that Auchinleck's allies were planning an offensive that would force DAK backwards. Soldiers were posted at the Egyptian border, about 7,000 men in the garrison in the port city of Bardia and 5,500 Italian troops in Sollum.



31st December
31st December, Rommel pulled the Afrika Korps back to El Agheila and **enhanced its position** with fresh men and new equipment.

2nd January
About **7,000 German soldiers** left in Bardia surrendered on 2nd January, 1942.

19th January
Sollum was well fortified, and around **5,500 surviving Italian soldiers** held out until 19th January 1942, when they surrendered due to lack of food and water.

TANKS IN BATTLE

How combat tactics worked

“OVER THE PERIOD 1943-44 WARRING COUNTRIES HAD DEVELOPED TACTICS AND COMBAT TECHNIQUES THAT WORKED WELL – AND, AS A RULE, ARE STILL BEING USED TODAY.”

During World War II, tank technology and tactics saw **radical development**. Indeed, the same basic principles that were established then still apply to the battlefield today. How did the fighting take place? Harald Sonesson guides us through battalion, platoon and company level.

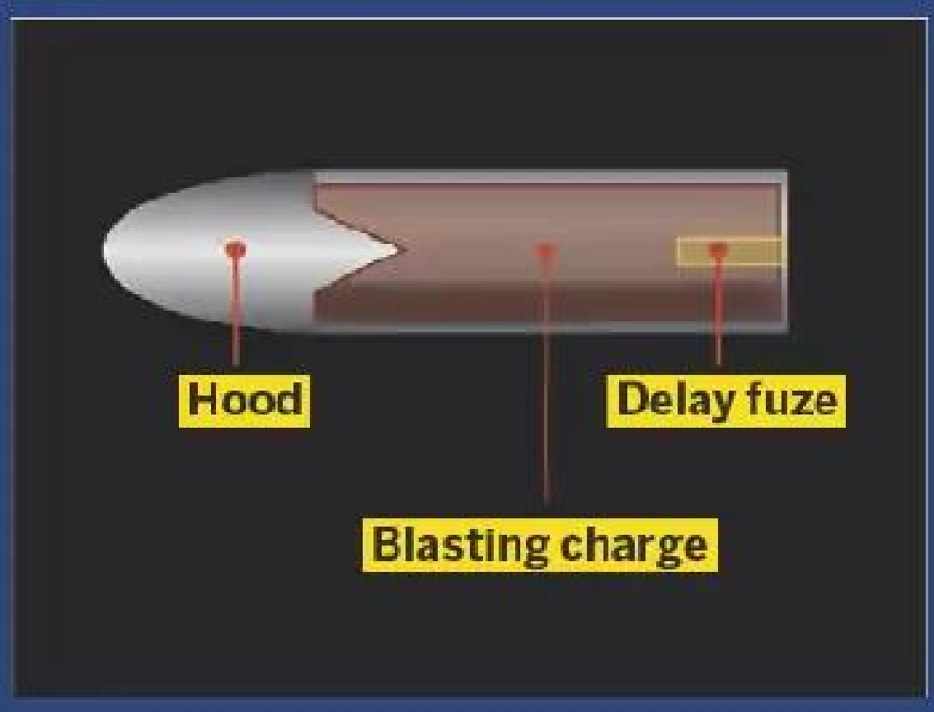
Gunner Ken Tout found himself on a battlefield south of St Aignan in France on 8th August. The fighting about the Falaise Pocket took place two months after the invasion of Normandy and in his book *Tank! – 40 hours of battle*, Tout gives a snapshot of how it felt in August 1944:

"I work my gun along the known hedgerows and woods. From this new angle I can see more of the woods across the gully. Trees. Undergrowth. Branches. Intricate, twisting tracery of branches, twigs and leaves. Those twisted variegated shapes felt safe. I count them. Assess them. Trees and branches. Twigs and leaves. A box shape. A box... BOX! Jab gun elevator, twist grip, crosswires ON! STAMP! (Snowie: 'Hornet! Hornet! Front!')"

Tout described how a flash spread from the 75-mm gun's muzzle to blind his telescopic sight, ►

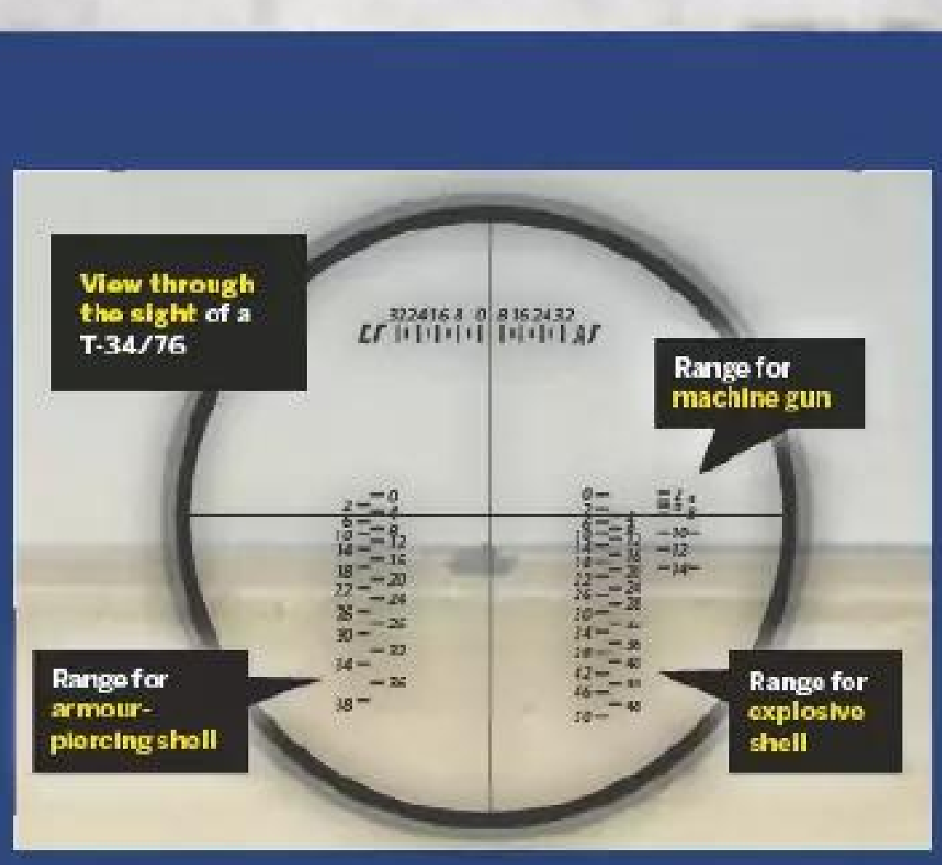
A German Tiger advances during the Battle of Kursk where around 8,000 tanks clashed in July 1943. On the right an abandoned T-34/76 model 43.

SZ-PHOTO/IBL


Hood
Delay fuze
Blasting charge

Armed projectiles

★ Three types dominated, p39


View through the sight of a T-34/76
Range for machine gun
Range for armour-piercing shell
Range for explosive shell

Guns and sights

★ Rain of fire, p42

Who does what?

★ Crew, p44

“LATER IN THE WAR, TANKS HAD ALL-ROUND USE”

▶ how the recoil caused the tank to shake and a sulphurous smoke spread through the turret. Then a flash of light from the enemy tank – a hit.

TANKS WERE FIRST put into service during World War I. They became hugely important at the Battle of Cambrai in 1917 when it was discovered they could break through enemy lines. Tactical development varied from nation to nation during the interwar period. The British were the first to produce fast mechanised forces that could operate on their own on the battlefield. The French chose to spread their tanks to support the infantry. The Soviet Union’s development was even more advanced, largely due to the extensive secrecy surrounding the armed forces they controlled and what they’d learned from them. Development was slower in Germany because the country had been banned from producing armoured vehicles by the Treaty of Versailles after World War I.

Ken Tout fought in a M4 Sherman during the invasion of Normandy in 1944.

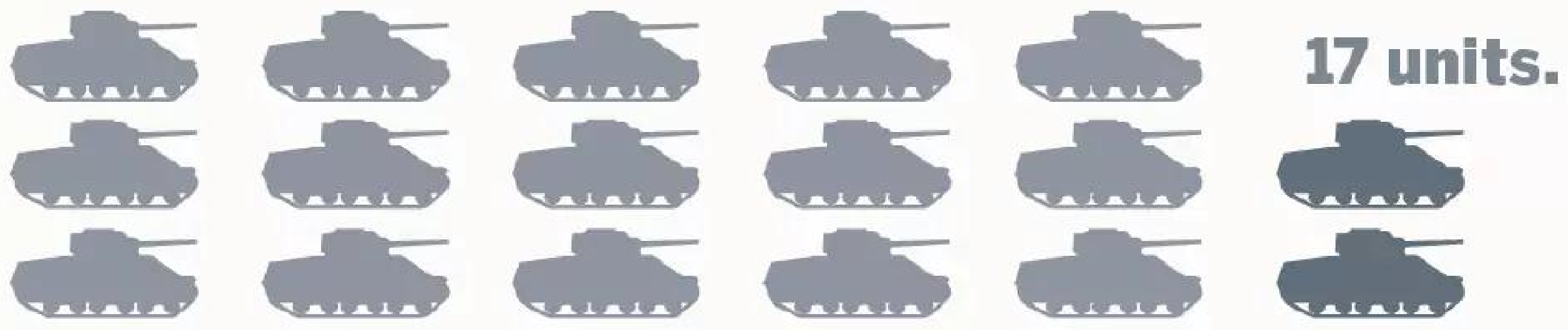
Before the breakout of war in 1939, tanks were usually optimised to address specific operations. There were light and poorly armoured – but fast – tanks for cavalry-like charges over large areas and against the enemy’s central forces; also powerful armoured vehicles, often with a howitzer gun to break through strongly defended lines. The fact that these vehicles were heavy and slow was inconsequential as they followed behind infantry, which ultimately determined their speed.

Later in the war, tanks had all-round use, less specialised with a main armament that worked just as well fighting armoured forces as they did infantry and soft targets. The heavier armour often – but not always – offered good frontal protection against armour-piercing ammunition.

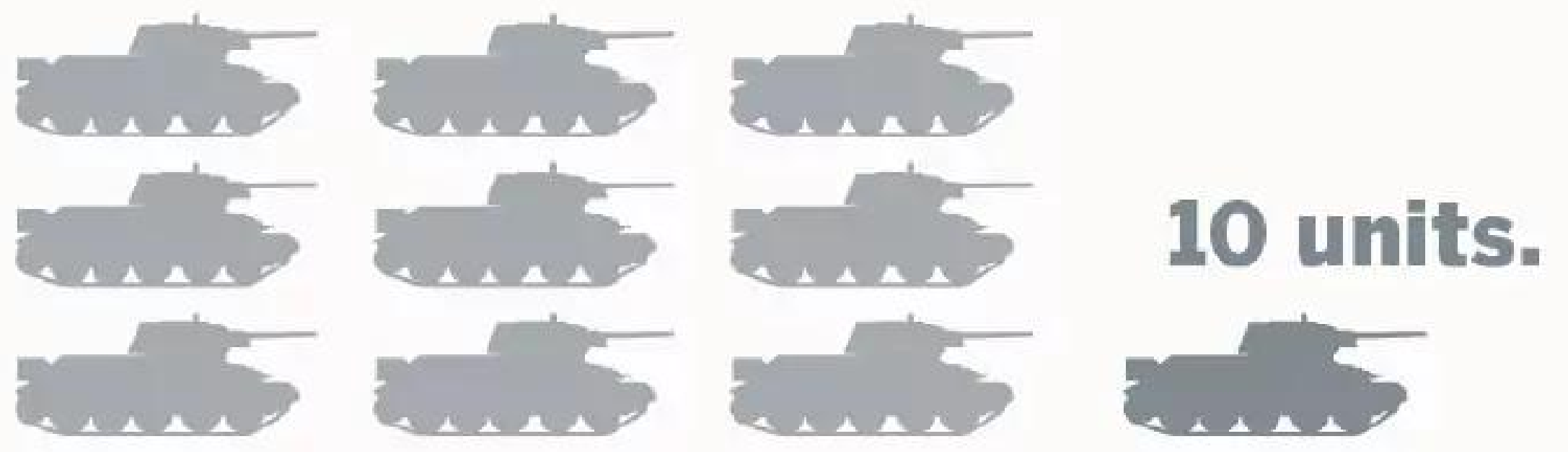
With the Soviet T-34/76, the US M4 Sherman and the German Panzer IV F2, mainstream tanks were developed that could, in principle, address all tasks on the battlefield. The main armament was acceptable, the hood provided adequate protection and the speed was good enough.

EXPERIENCES FROM EARLY in the war meant that over the period 1943-44 warring countries developed tactics and combat techniques that worked well – and as a rule are still being used today. Then as now, tanks were deployed to create decisive breakthroughs and change a battle’s outcome. Extensive firepower together with good protection and mobility gave huge

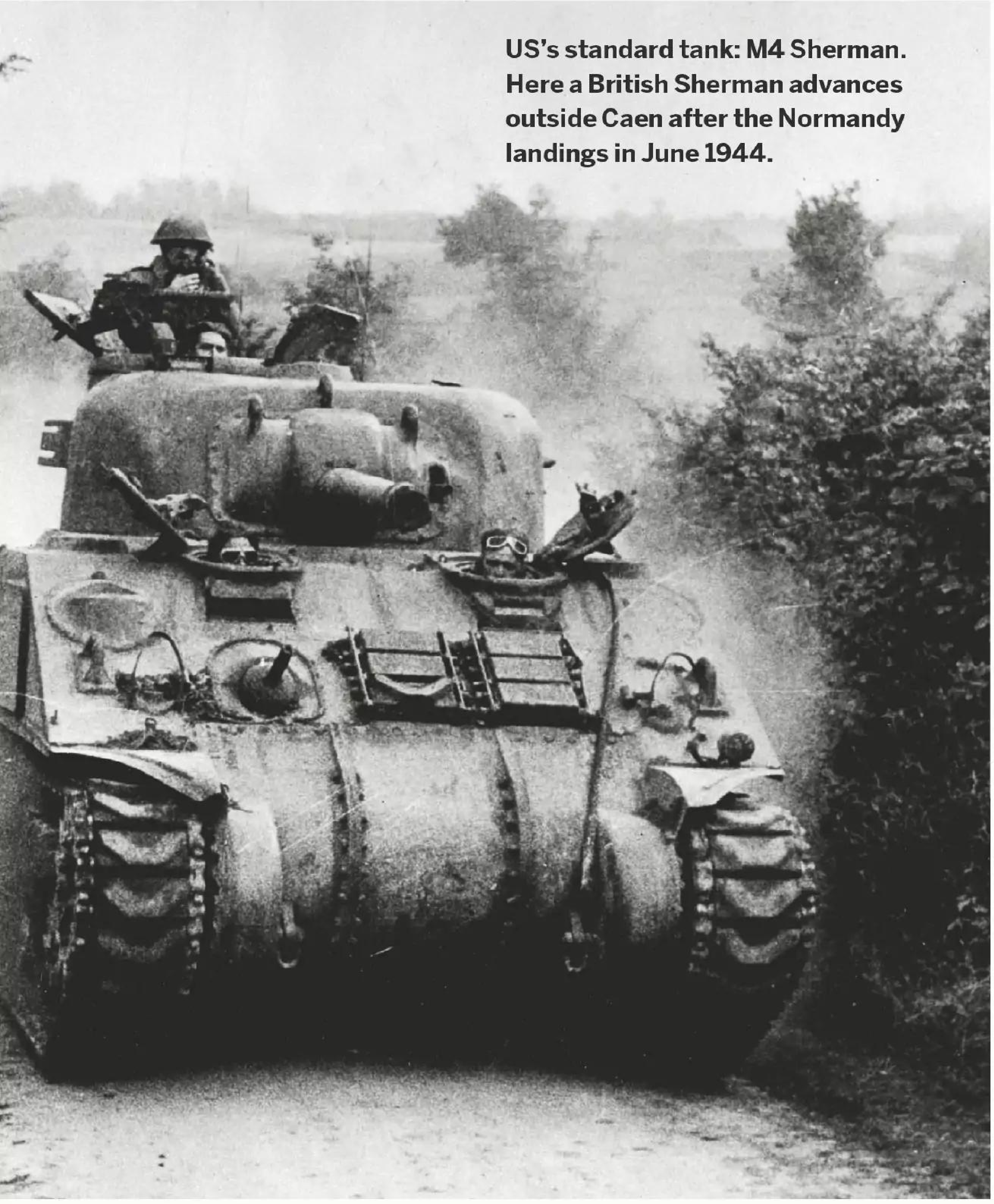
How a tank company was organised in 1943-44



🇺🇸 **USA** 3 platoons x 5 tanks + 2 support tanks



Soviet Union 3 platoons x 3 tanks + 1 support tank


US's standard tank: M4 Sherman. Here a British Sherman advances outside Caen after the Normandy landings in June 1944.

PAUL POPPER/POPPERFOTO/GETTY

Germany's standard tank: Panzer IV F2. In the spring of 1943, additional 'spaced' armour was also introduced outside the turret and body.

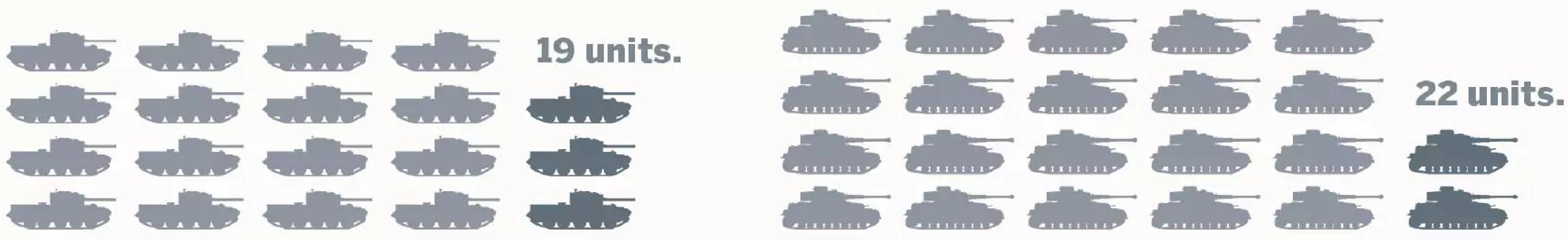
Soviet Union standard tank: T-34/76. Here's a model from 1942 welded with extra armour and a new driver's hatch with two periscopes.

power over a limited area that was important to attack and capture.

Often it was about creating a breakthrough in the enemy's front lines and advancing to the enemy's rear where artillery, support and personnel were tempting targets. But first and foremost, the purpose was to capture important terrain – for example, to ensure further advancement or to surround enemy forces. If possible, try to surprise your enemy, which was easier thanks to better mobility. Surprise, mobility and firepower made it easier to achieve local superiority, which could form the basis for further progress.

ORGANISATION

In the years 1943-44, a tank company consisted mostly of three or four platoons as well as one or two tanks for company staff, typically the commander and his deputy. Each platoon comprised 3-5 tanks. They were organised according to several factors, not least the availability of vehicles. Lack of radio equipment (transmitters/receivers) and access ▶



Great Britain 4 troops x 4 tanks + 3 support tanks

Germany 4 platoons x 5 tanks + 2 support tanks *

* In 1944 three different models were introduced with 10, 14 or 17 tanks in the company.

GRAPHIC: CHRISTOFFER REHN

Two men from a Soviet tank crew investigate a shell hole in the turret of a German Panzer VI Tiger. Taken July 1943.

to experienced platoon leaders also played a role. The harder it was to lead, the fewer the tanks allocated to the platoon/company.

A MEDIUM-HEAVY German tank company consisted of 22 tanks – Panzer IV or Panzer V (Panther). These were divided into four platoons with five tanks in each and two as support vehicles.

In November 1944, three different new organisational options equipped with Panzer IVs or Panthers were specified:

- 17 tanks divided into three platoons with five vehicles in each and two support vehicles.
- 14 tanks divided into three platoons with four vehicles in each and two support vehicles.
- 10 tanks divided into three platoons with three vehicles in each and one support vehicle.

In April 1945, 10 tanks were introduced as standard in the Panzer Division Type 45.

In a Soviet tank brigade or tank regiment, the company consisted of 10 tanks: three platoons with three tanks in each in addition to a support vehicle.

A medium-sized US company consisted of 17 tanks, which were divided into three platoons with five tanks in each plus two support tanks.

The heavy British armoured company found in armoured divisions and independent armoured brigades consisted of 19 tanks divided into four platoon-sized 'troops', each with four tanks, as well as three support tanks. When the M4 Sherman Firefly, a M4 re-tooled with a powerful 17-pounder (76-mm) gun, was added in the spring and in the summer of 1944, each platoon was eventually given one, despite the fact the rest of the force was equipped with Cromwell cavalry tanks.

In the armoured division's tank companies, two of the support tanks had a short 95-mm howitzer instead of a tank gun. The tank company in an infantry company was equipped with 18 Churchill tanks in 1944. Five platoons with three tanks each and three support tanks.

BUNDESARCHIV BILD 101I-024-3536-28

Salvage and repair units were critical for maximising the number of working vehicles. Here in the workshop the soldiers change the engine of a Tiger belonging to the 9th Company in the Großdeutschland Division. Eastern Front 1943 or 1944.

Two of the tanks in the company were equipped with short 95-mm howitzers.

THE NUMBER OF tanks in the units described here are theoretical numbers. In practice, fewer vehicles were available due to breakdowns, damage, destruction in battle or because they were stuck in impassable terrain.

Forces relied on their own resources for salvage and repair, which were critical in maintaining the number of working tanks at their disposal. If there was no time for inspecting or repairing tanks, then the likelihood of breakdowns increased. But the most decisive factor was the army's ability to produce new tanks to replace those that were lost.

THE BATTLE

The tank company usually fought with the rest of the battalion. Some platoons and tanks fought alone, but this was the exception. Tank commanders – and of course platoon and company commanders – had to know at what distance conditions were favourable for entering a battle. If their own armour and armaments were inferior to the enemy, it was critical to open fire at closer range and at a direction that made it possible to penetrate the target – typically the side or rear of a tank rather than its front. If you had better armour and guns, you could fight from a greater distance where you still had the ability to hit while being more or less immune to return fire.

The firing range of tanks varied greatly – partly because of the tank's own guns and ammunition, but also because of the position of enemy tanks along with their size and thickness of armour.

In open terrain, the firing range of medium-heavy tanks could be long, and in favourable conditions they could strike and impact armoured targets at distances of well over two kilometres. These perfect conditions were rare – even in open terrain the firing range usually didn't exceed 1,500 metres and was usually significantly less.

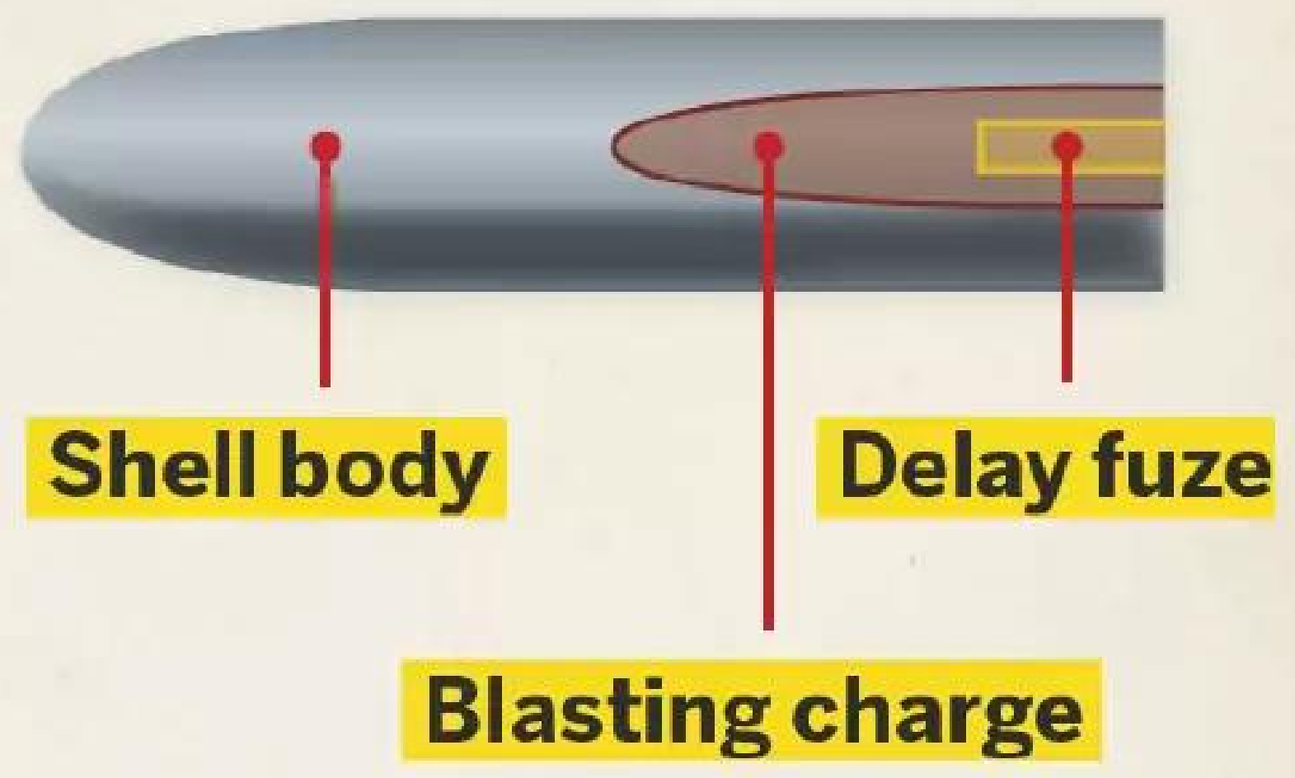
The easiest way to prevent damage to a tank was, of course, by avoiding discovery – for example, when advancing by taking advantage of natural cover, the dark or by camouflaging the tank. This way, the ►

> **"THE FIRING RANGE OF TANKS VARIED GREATLY"**

Three armed projectiles dominated the battlefield

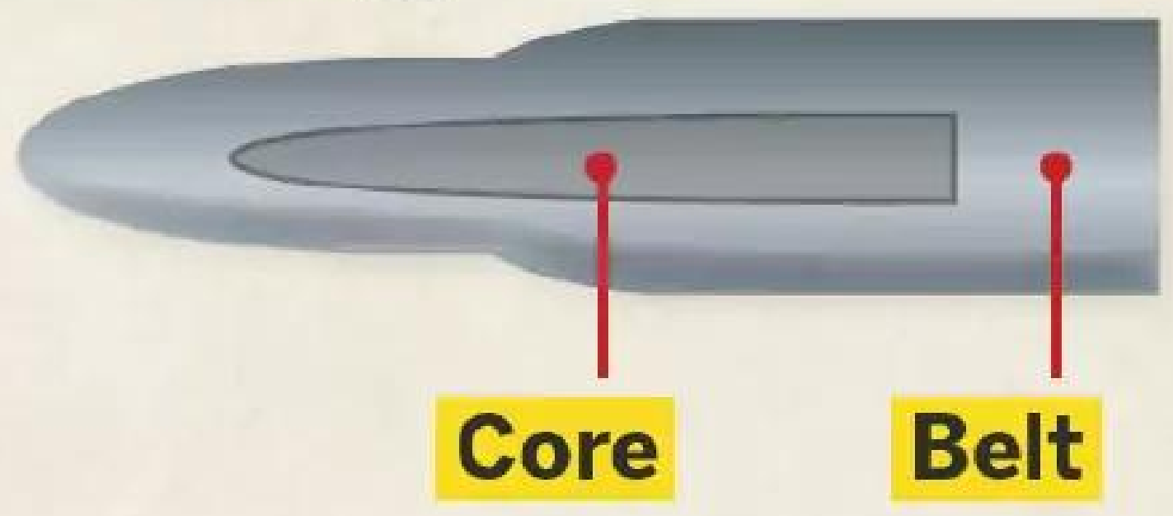
During World War II, three main types of armour-piercing ammunition were used.

Armour-piercing shell



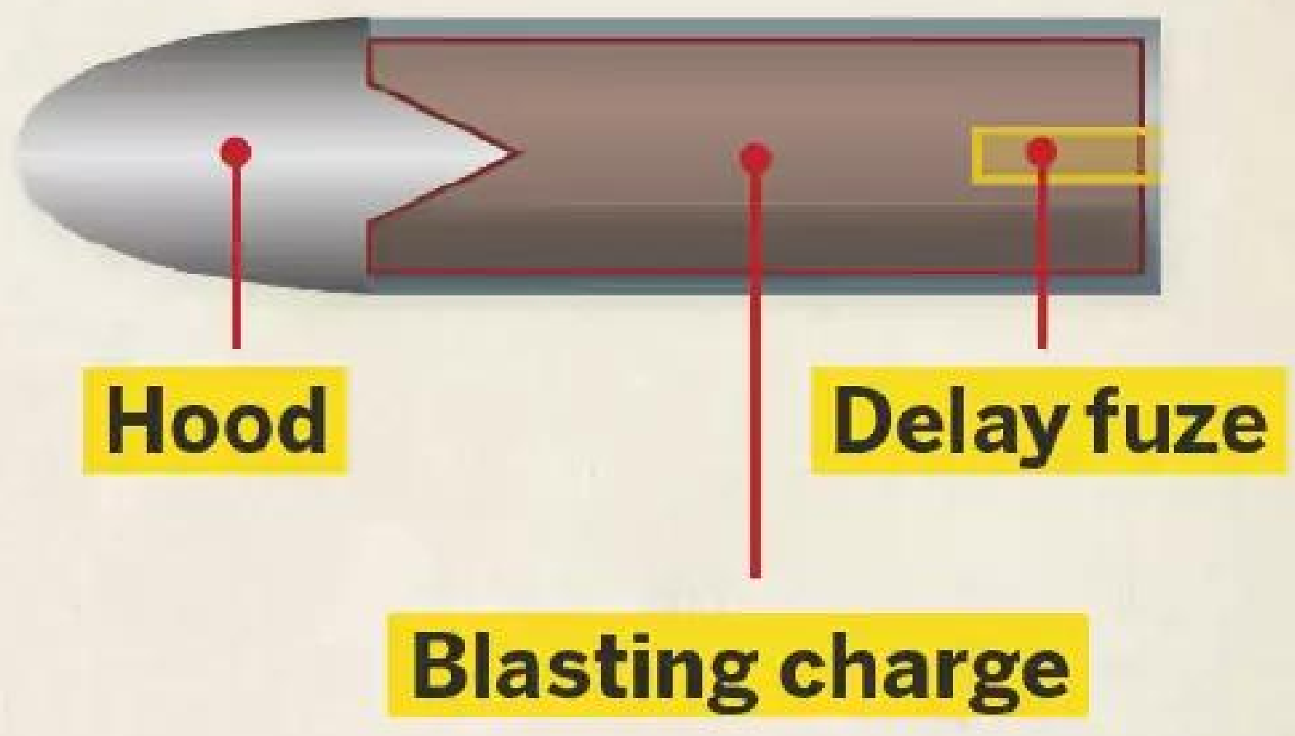
★ The most common shell. The armour-piercing shell was a full bullet (shell diameter equal to the gun barrel) that struck the target's hull before an explosive charge detonated. Its effects were shrapnel generated from impact, the exploding shell and the pressure effect of the explosion.

Armour-piercing discarding sabot

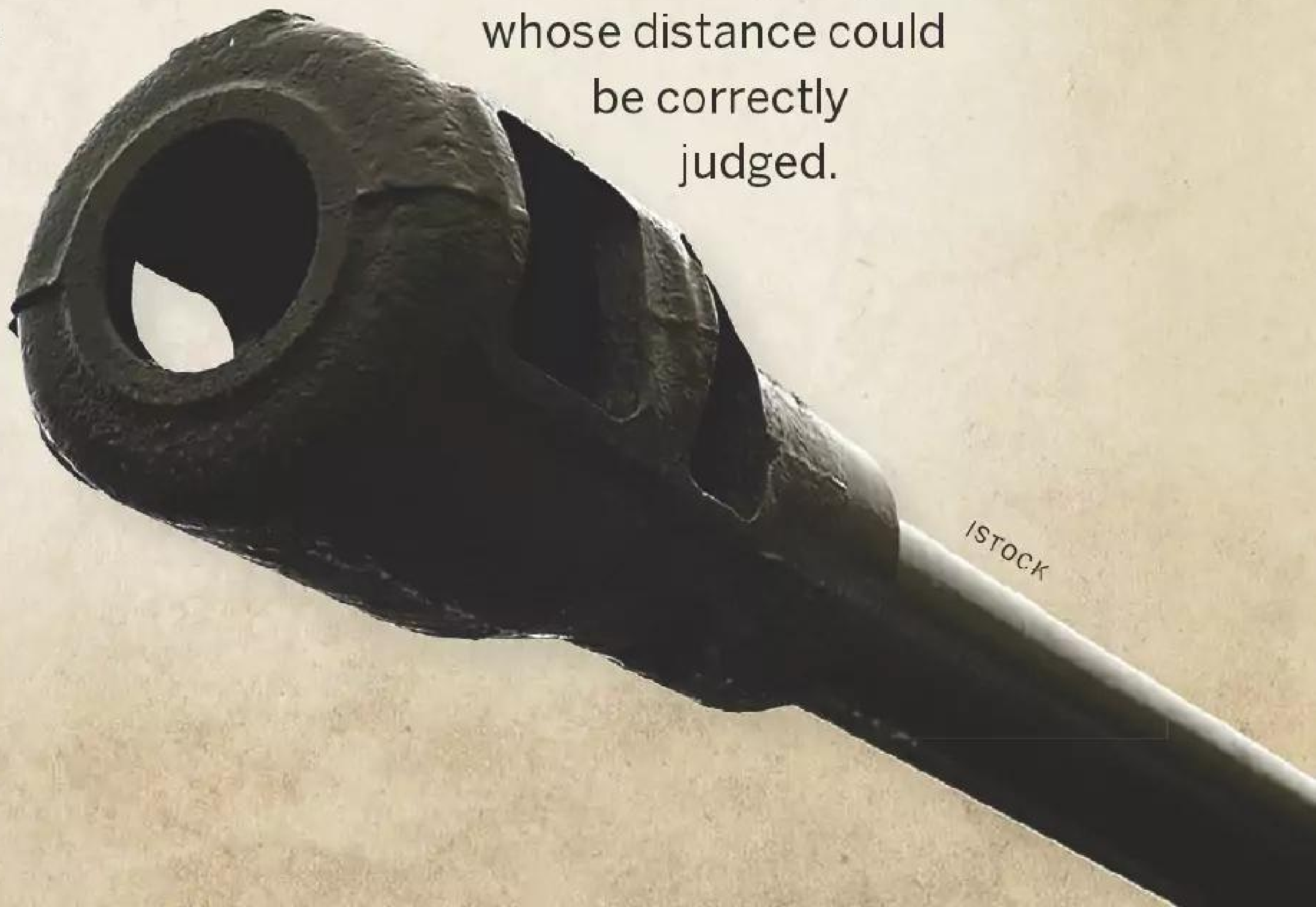


★ APDS is a type of kinetic energy projectile. It was manufactured from tungsten carbide and was significantly smaller in diameter than the gun barrel, which meant the projectile generated a higher exit speed from the barrel than armour-piercing shells. This, coupled with a flatter projectile path and shorter time to impact, meant the projectile offered greater penetration at normal combat distances. Tungsten was a rare metal, however, and so this ammunition type was never found in enough quantities. From 1943, it was increasingly uncommon among German forces, although supplies increased on the Allies' side.

High explosive anti-tank



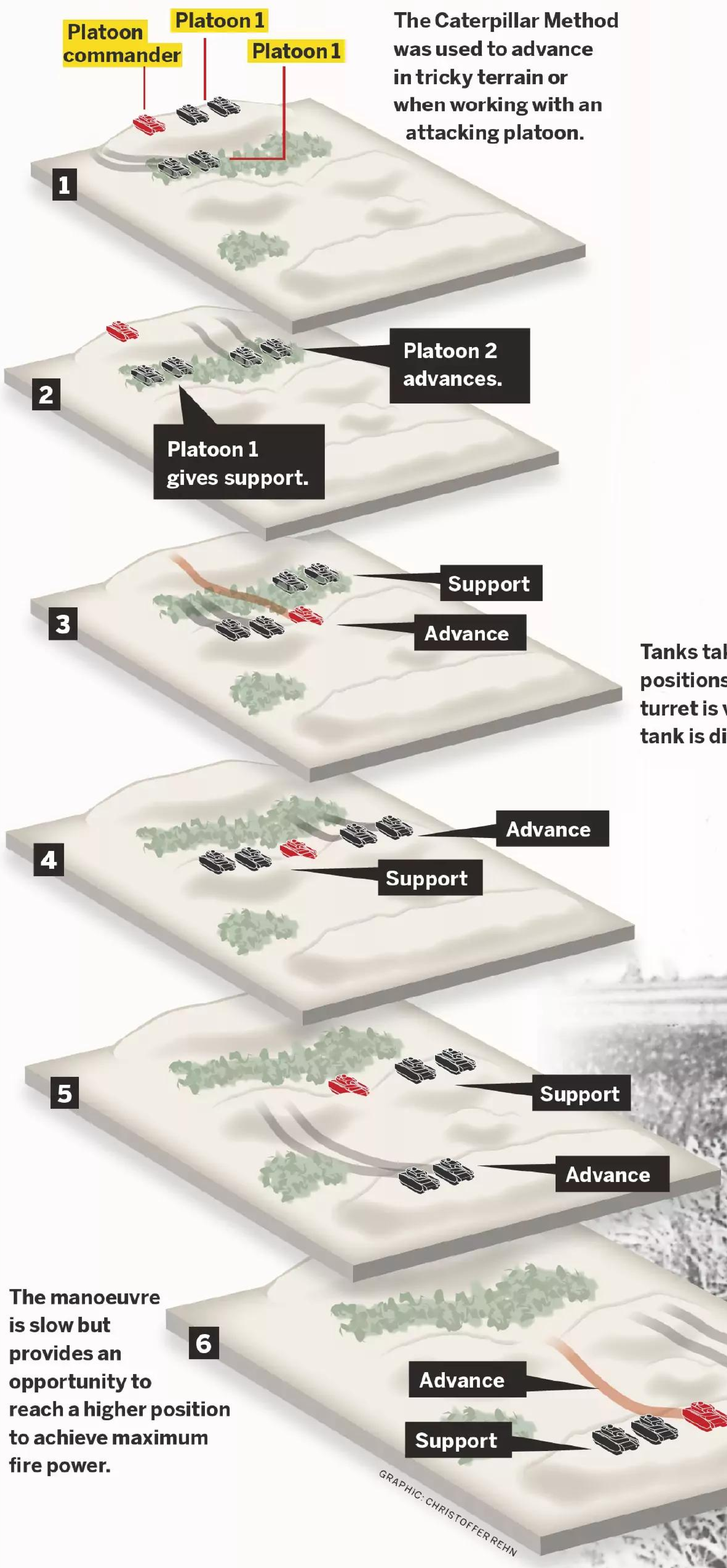
★ The shell caused damage through its shaped-charge action. As it struck, the shell exploded to push the shell forward. It subsequently broke through hollow casing to convert it into a projectile, which was melted and focused into a targeted beam. The explosive pressure exerted allowed it to cut through the armour plating. The projectile had a low velocity and high trajectory, making it difficult to strike anything other than stationary targets whose distance could be correctly judged.



ISTOCK

GRAPHIC: ERIK LINDHOLM/CHRISTOFFER REIN

A German platoon advances on the battlefield



The Caterpillar Method was used to advance in tricky terrain or when working with an attacking platoon.

Tanks take up potential firing positions where only their turret is visible or where the tank is difficult to spot.

The manoeuvre is slow but provides an opportunity to reach a higher position to achieve maximum fire power.

GRAPHIC: CHRISTOFFER REHN

risk of being discovered was reduced, increasing both survival rates and the chances of getting off the first shot.

IT WAS SMART to choose a firing position that exposed as little of the tank as possible, thus reducing the enemy's chances of striking back. After one or two opening shots, tanks would change position, which meant the enemy had to rediscover their new position before firing at them again.

Enemy infantry that appeared near the tank were fired on with machine guns. If the crew discovered a platoon nearby – or even on the tank – they could defend with a machine gun and hand grenades. Perhaps other tanks could help by strafing the enemy to keep them away. It might even be possible to simply drive over the entire squad.

Infantry were fought with parallel-mounted machine guns from the turret. Explosive grenades were fired on soft targets as well as those further (say 800-1,000 metres) away.

Buried and hidden anti-tank guns were considered particularly problematic and dangerous. They were hard to detect and not easy to combat, since

the surface of the target was small and required ammunition that could pass through the gun shield if the gun was to be hit from the front. In general, explosive shells were used or – in emergencies – armour-piercing ammunition.

TANKS WERE PARTICULARLY effective when attacking in open or relatively open terrain. Their mobility, protection and firepower were well suited in such situations. Their exclusive qualities ensured armoured forces were rarely used for defence. Normally, they would only be handed defensive operations when no other forces were available – for example, they might be used to hold important territory when the enemy had broken through other defences. As soon as other forces were available, the tanks were replaced.

In attack an armoured force tried various ways to neutralise the limitations imposed by the defence. Minefields could be revealed – if at the same time defenders were neutralised so they couldn't shoot back. Blown-up bridges could be repaired or replaced temporarily. There might be shallow waters where tanks and other vehicles could cross. When attacking, it was important to have crews and engineers available to clear mines and rebuild bridges.

Forests and built-up areas with limited visibility were not good terrain for tanks. Such conditions gave great opportunities for infantry to target the tank's weaker armour at its sides and rear using close-quarter anti-tank weapons and tactics.

Tank commanders who tried to observe the unpredictable terrain via an open hatch could also be exposed to a barrage of rapid gun fire from infantry. This was the main reason for avoiding forested or urban areas as much as possible. If necessary, infantry became responsible for such areas. For a clever and well-prepared enemy however, there ►

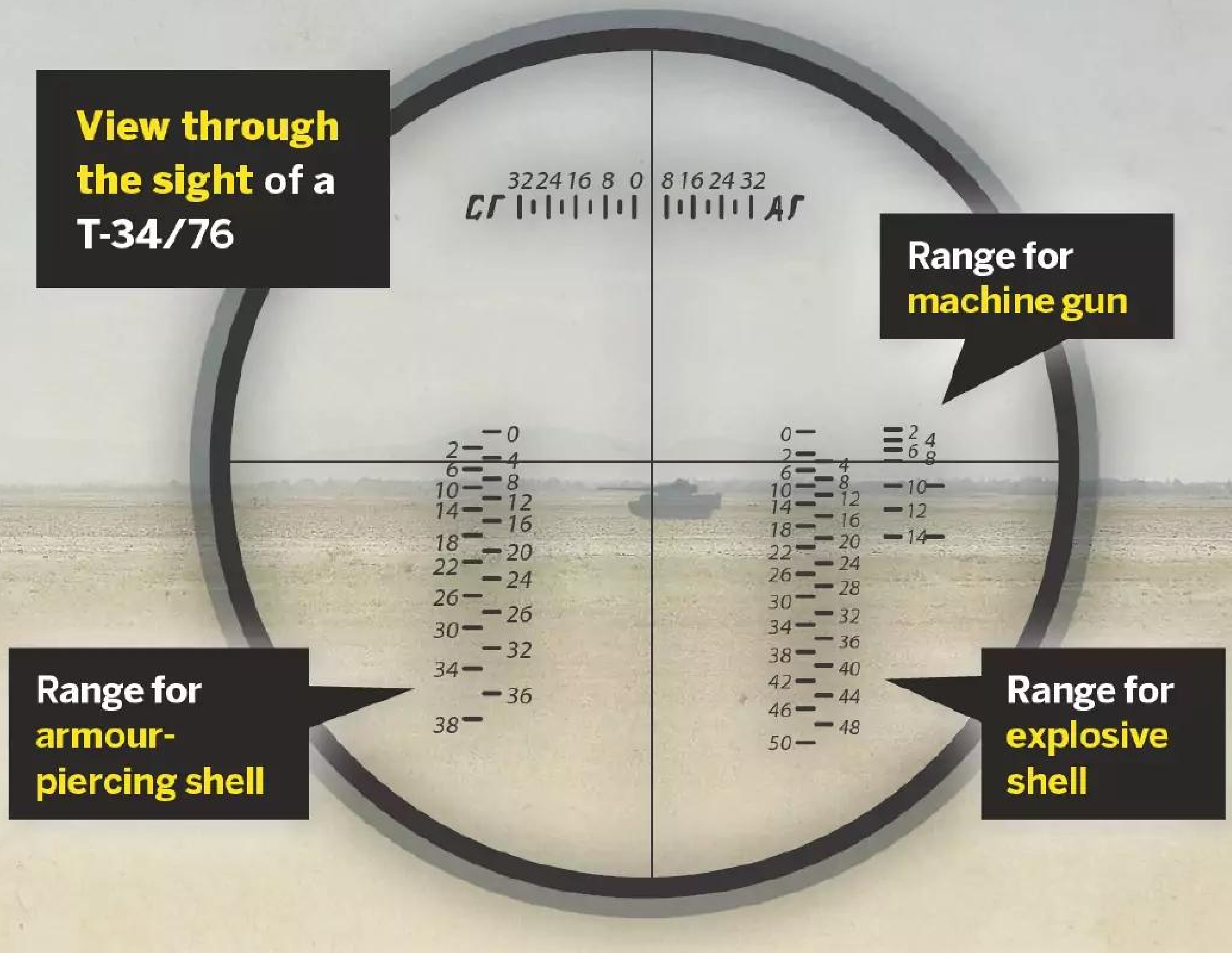
"TANKS WERE PARTICULARLY EFFECTIVE AT ATTACKING IN OPEN OR RELATIVELY OPEN TERRAIN."

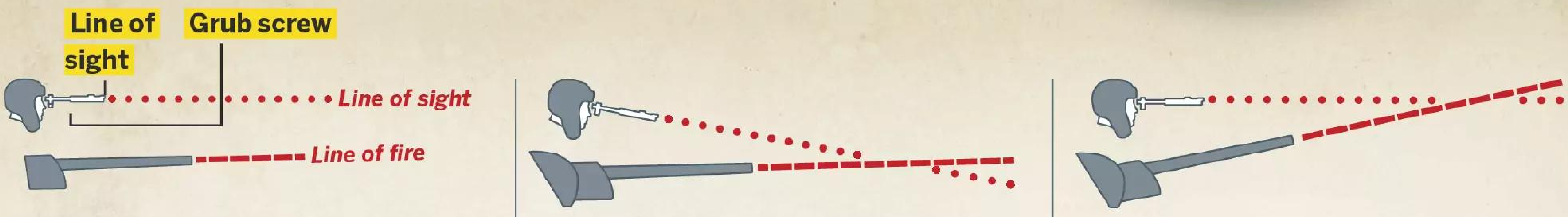
**This tank crew utilises tall vegetation and buildings to try and conceal its Panzer IV while seeking out the enemy.
In the background, a light reconnaissance Sd Kfz 222. The Battle of Kursk in July 1943.**

SZ-PHOTO/IBL

Aim and fire the gun

★ **To hit a target at a certain distance, the gunner must compensate for the shell losing height on its way. This is done with a grub screw. The setting is the angle between the line of sight and the gun's core line. The angle changes depending on the type of ammunition and for parallel machine guns.**


View through the sight of a T-34/76
СГ 32 24 16 8 0 8 16 24 32 АГ
0 4 8 12 16 20 24 26 32 36
2 6 10 14 18 22 26 30 34 38
0 2 6 10 14 18 22 26 30 34 38 42 46 50
4 8 12 16 20 24 28 32 36 40 44 48
2 4 6 8 10 12 14
Range for machine gun
Range for armour-piercing shell
Range for explosive shell

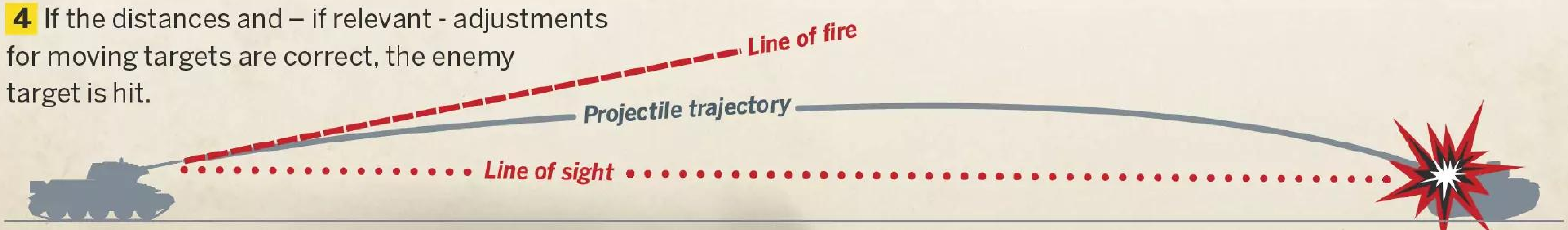

Line of sight
Grub screw
Line of sight
Line of fire

1 Crew detects an enemy target at 1,000 metres. The sight and gun are usually set to a default setting: for example, armour-piercing shell, 600 metres.

2 The gunner sets the grub screw to 1,200 metres for an armour-piercing shell, which lowers the sight. Its view now shows that the gun is too low for the shell to reach the target.

3 When the gunner raises the gun, the sight follows automatically. He continues to raise the gun until the target ends up in his sights. Then the shot can be fired.

4 If the distances and – if relevant - adjustments for moving targets are correct, the enemy target is hit.


Line of fire
Projectile trajectory
Line of sight

GRAPHIC: CHRISTOFFER REHN

This German Tiger's sight shows a burning T-34 somewhere in the Soviet Union in 1944.

> **“THAT THEY [THE TANK CREW] WERE WELL TRAINED AND PRACTISED WAS CRUCIAL FOR THEIR SUCCESS”**

▶ was much to gain by shepherding attacking tanks into terrain where their power could not be fully utilised.

Because tanks were constantly on the move, either in battle or being moved to another location it was important to plan enough time for maintenance. If the maintenance was not carried out, tanks would break down and possibly cause accidents. Fire disruption or engine failure in combat was not something anyone wanted. As soon as there was an opportunity, crew had to check the tank was working in their respective areas of responsibility. Only when the job was done could they eat and rest.

INDIVIDUAL TANKS

A single combat tank with its crew is the smallest independent tank component. That they were well trained and practised was crucial for their success. If one crew member didn’t do his job, he jeopardised the lives of everyone else in the tank too. And ultimately it was important in turn for other members of the platoon or company, as well as the on-going operation.

When a crew member discovered a target, it resulted in a series of actions – all of which were well-rehearsed in detail. If the tank who discovered the target could also engage the enemy in question, it was done at the same time as reporting its presence to other tanks.

The tank commander’s most important role was to lead the fighting and ensure that the most dangerous targets were fought first and with the right weapon. This he did by giving the fire command, for example: “Gunner, high explosive, anti-tank gun, 900 metres, 12 o’clock, fire when ready”. The gunner would swing the turret into position and direct the gun at the correct height to reach the target while adjusting the setup so that the correct ammunition and distance were set (see graphic). If necessary, the loader switched the ammunition in the gun, which took time. In critical duelling situations, the appropriate ammunition was pre-loaded.

AT THE SAME TIME, if possible, the driver swung the tank so that the better protected front faced the enemy. If the tank was being advanced on, he braked slowly and carefully before the shooter fired as soon as he thought he could hit the target. The tank jerked from the powerful gun recoil and if the ground was dry, a dust cloud rose from the ground in front of the vehicle. The tank commander along with the other crew members then tried to note whether the targets had been hit. Armour-piercing ammunition that hit armoured targets gave off a lightning glow. The track light gave an indication of where the shot went relative to its target.

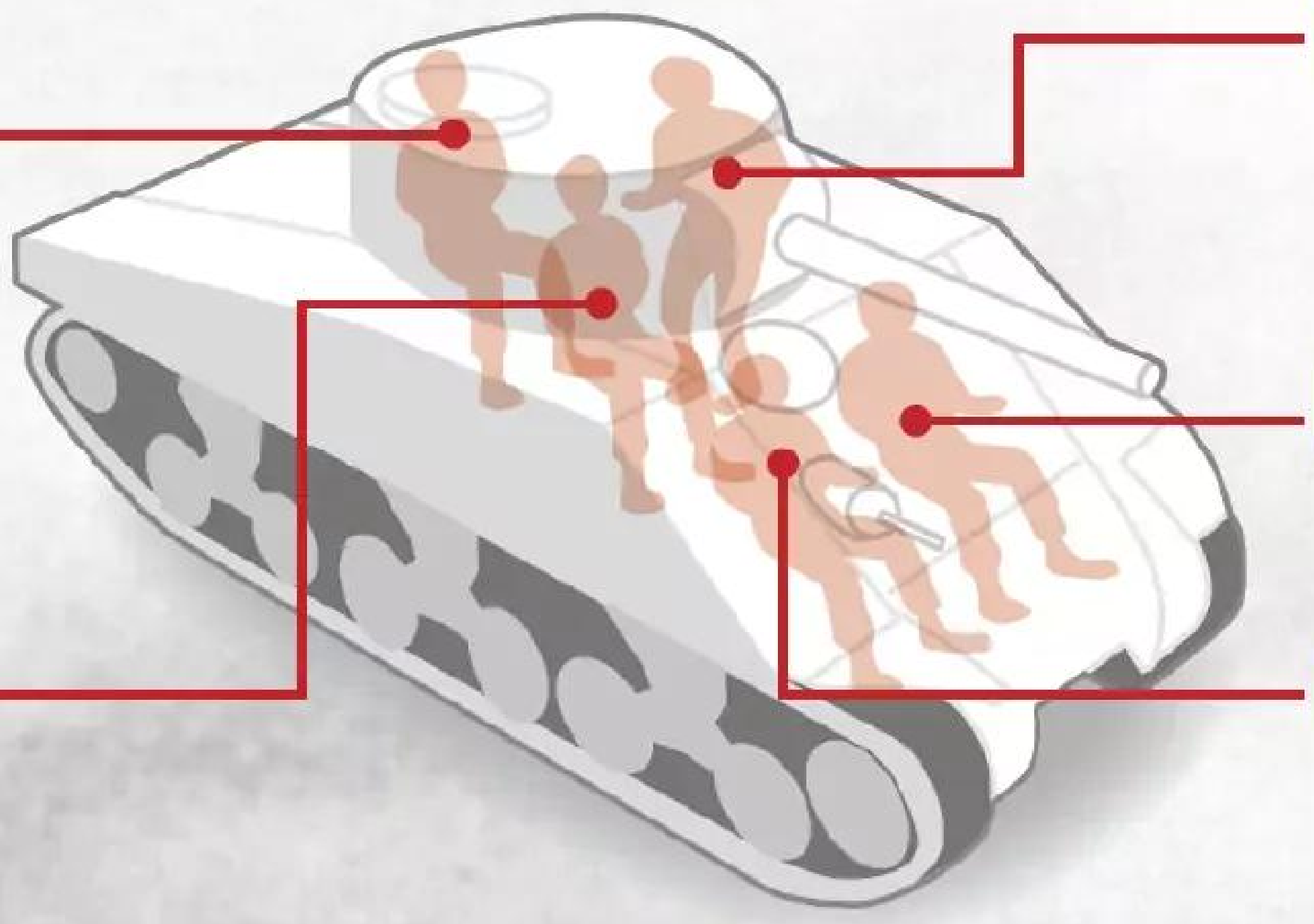
IF THE COMMANDER gave no further orders, the loader used the same ammunition. Normally, defending against dangerous targets was repeated until the target was either out of action or assumed to be disabled. If the target was assumed missed, further fire would follow in accordance to memorised guidelines. It was important that the gunner and the turret were sighted on the spot the commander thought was most dangerous. Thus the time between detecting targets and firing was as short as possible. The commander had the best opportunity to observe what was happening, but the others also helped in relation to observation, visuals and other tasks.

In principle, firing would happen while the tank was stationary. If not, results ▶

A British sergeant with radio microphone in hand in his M4 Sherman in Italy in 1944. He needed to have his head outside the tank to improve visibility.

CAPT. TANNER/IWM/GETTY

The duties of a M4 Sherman's crew



Tank commander leads the crew in battle and movement. He observes the platoon commander, other tanks, enemies, terrain and mines; signalling to the platoon commander and other tanks.

The gunner is responsible for armaments and sight instruments. He fires the main gun and turret machine gun on the commander's orders.

The loader oversees refilling ammunition, loading the gun and machines guns, plus operating the radio.

The driver is the tank mechanic and makes sure that everything is working.

The machine gunner is ready with the front machine gun. He's also the reserve tank driver and has the same observation equipment as the driver.

The M4 crew's roles and tasks were similar to other countries' tanks at this time.

GRAPHIC: CHRISTOFFER REHN

were not guaranteed, except at close range. The tank commander ordered the type of ammunition to be used before entering a battle depending on whether he figured they would be firing on tanks or softer targets.

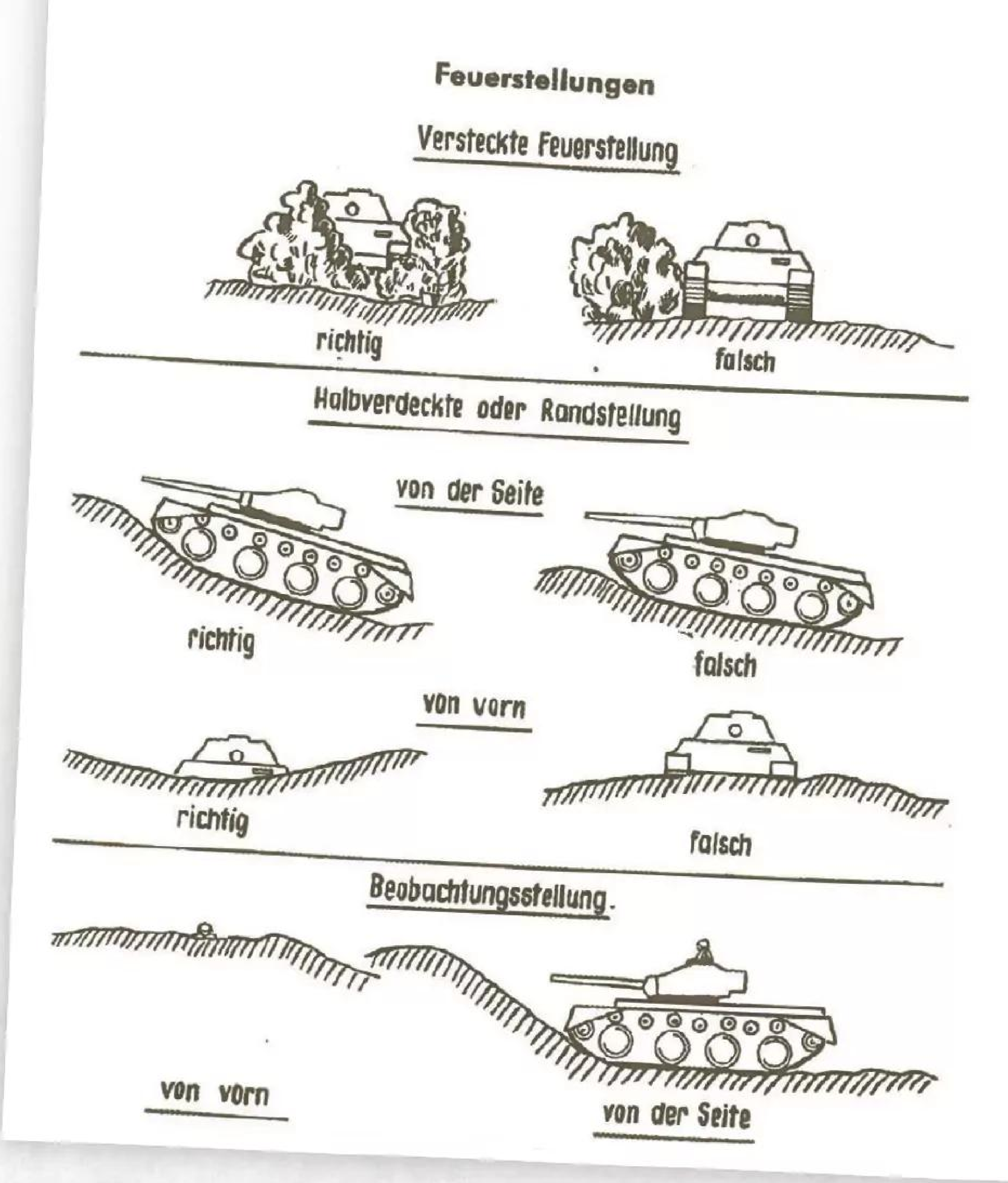
The machine gunner who normally sat next to the driver in the hull was not managed by the tank commander to any significant extent. His job was to observe the terrain immediately in front of the tank, ready to engage his machine gun if a threat appeared.

In addition to ensuring that the tank was in the right position among the platoon while performing tasks assigned by the platoon commander, observing and giving orders to the crew, the tank commander also had to make sure he understood what other tanks – both in his own platoon and among the enemy – were doing, what the radio orders or signals from the platoon commander were and report on detected or defeated targets, all while lively radio communication and ambient noise rang in his ears: a rather hectic and stressful work situation.

TANK PLATOON/TROOP

The platoon commander had – like other tank commanders – to lead his own tank, but he also directed all other tanks in the platoon

> "IN PRINCIPLE, FIRING WOULD HAPPEN WHILE THE TANK WAS STATIONARY"



A contemporary German instruction manual reveals how the commander should choose firing and observation positions.

using either signalling or radio. He'd also listen to the company commander's radio traffic and continuously report from the platoon to keep his superior constantly updated. In almost every manoeuvre tanks kept about 50 metres apart, to reduce the amount of damage caused by enemy fire and air attack. Tanks and anti-tank guns standing only an arm's length apart are pure fiction from the movies.

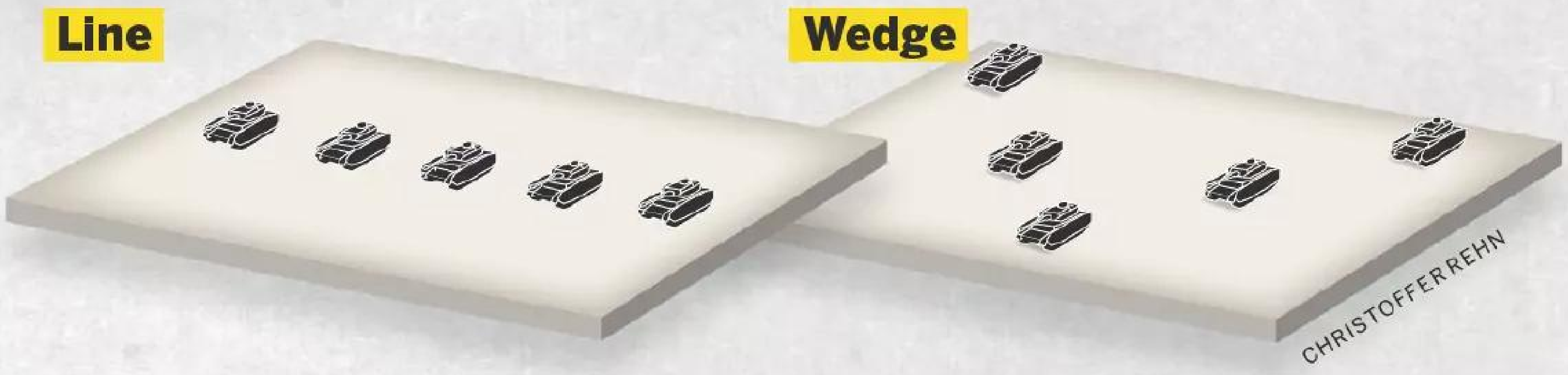
A German platoon's most common attack formations were in line or the platoon wedge (*Keil*). The tanks would form into a wedge-shaped formation, with the most heavily armed and armoured vehicles forming the tip and the sides, with the platoon commander at the front in the middle. On each side of him, but about 25 metres behind, came the next two tanks. Behind these were the last two tanks, also 25 metres behind the tanks in front and set to the side. This meant the platoon's width was around 200 metres, with a depth from front to back of around 50 metres. The wedges gave increased firepower at the sides. In line, the width was the same, but there was no depth.

OTHER COUNTRIES' PLATOONS used similar formations. In those cases where the platoons had fewer than five tanks, the width was reduced proportionally. When the platoon advanced within firing range of the enemy, one part was made ready to open fire (see graphic on page 30) while the others advanced.

When all or part of the platoon were arranged to open fire during the battle in either attack or defence, the tanks eventually sought positions where the vehicle was exposed as little as possible. As they prepared for defence, they avoided discovery by hiding tanks outside of firing range while observing the enemy advance.

When attacking, it was necessary to keep up the pace and follow orders. If the platoon commander led the battalion from the front, he had to keep track of where he was on the map. Where was the enemy? Could they make a detour if necessary if they came across impassable obstacles or terrain like blown bridges? All were to be avoided if possible, unless orders dictated otherwise.

Procedures across countries were often similar, emphasised by the fact that the US Army Field Manual *FM 17 – 30 Tank Platoon* from 1944 ►



CHRISTOFFER REHN

Line and wedge were common formations when German tanks attacked in open terrain. The distance between the tanks is not drawn to the scale in the illustration.

German tanks in General Gerd von Rundstedt's army advance on the Eastern Front in the summer of 1941, possibly 1942.

ROGER-VIOLLET/IBL

contains images that are identical to those in the corresponding German manual.

TANK COMPANY

The challenges that the company commander faced were the same as battalion and platoon commanders – albeit at a higher level since he led three, four or maybe five tank platoons. In addition, there might be infantry and artillery divisions, support functions and – for good measure – an often-demanding battalion commander.

Companies often used the platoon wedge formation, but paired it with the so-called inverted wedge (*Breitkeil*). With four platoons, it provided an approximate width of 200-250 m and a depth of 600 m. With two additional platoons in the second section, this extended to 400-500 metres wide with a depth of 400-500 metres.

The mission, what was known about the enemy (including its strength), the terrain and the need for firepower at the front were some of the factors that governed the company commander's choice of formation.

EXTENDED JOURNEYS WERE tough on both tanks and personnel, primarily on the driver. The average speed for the force was 10-15 km/h. If the company was being moved over long distances, hopefully somebody higher in command had arranged rail transport. Advancing across terrain was usually significantly slower than by road, but the road quality – to the extent that there were roads – varied across different sections of the front and with the season. Another problem was that as tanks grew heavier, bridges were increasingly a limiting factor.

An important task for the company commander was to ensure the company were fit to fight in the long run. He had to make sure that the soldiers were rested, that there was time for necessary maintenance, that food, ammunition and fuel were available, and that damaged tanks were recovered.

Badge of the Royal Tank Regiment.

TANK SYSTEMS

To what extent did the tanks and tank forces battle during World War II and how did they impact the outcome of the war? By itself, the tank had no decisive significance – it was by building versatile composite forces with good mobility, good protection where needed and great firepower that made it possible to influence outcomes.

The enormous firepower that quickly ended mobile warfare during World War I, forcing both sides underground in a war of attrition, was now countered by mobile armoured forces that could smash or manoeuvre around defences to head straight to the heart of the battle.

THESE VERSATILE ARMIES offered different kinds of opportunities that in the short term made them practically independent. They comprised forces combining infantry platoons with tanks, reconnaissance and artillery, command units and – last, but not least – supply units providing food, fuel and ammunition.

Armoured forces found themselves part of a larger system where the weakest link set the

PHOTOQUEST/GETTY

A US Sherman tank commander aims his .50-calibre Browning M2 machine gun. This is probably during an exercise since it's not loaded.

Soviet T-34/76 in firing position in Stalingrad in 1942 or 1943, according to the information accompanying the photo.

SOVFOTO/UIG/GETTY

limitations. The Allies soon caught up with the head start Germany had enjoyed at the beginning of the war with its armoured divisions and blitzkrieg tactics. They simply observed – and learned from – the enemy. This applied to both combat skills and tactics at a lower level, as it applied to the platoon, company and battalion. Technological development also followed the same track.

Towards the end of the war, tank forces became increasingly alike in both construction and appearance – although not identical. The idea that tanks were part of a 'system of systems' remains alive and well even today. Their strengths were – and are – dependent on other systems, which together provide opportunities to achieve significantly more than might otherwise be possible.

THE CHALLENGE IS to find the right balance between the various functions – within the financial framework that exists. The basic combat technique and tactics for tanks are largely the same as those used by both sides at the end of WWII. That said, weapons capable of threatening tanks have increased over the years. Helicopters, fighter jets, anti-tank robots and a host of other weapon systems have contributed to the fact that tanks are repeatedly referred to as 'out of date'. And yet they still hang on.

> **"CIRCUMSTANCES REQUIRED TRUST IN EACH OTHER TO CARRY OUT THEIR SPECIFIC TASKS"**

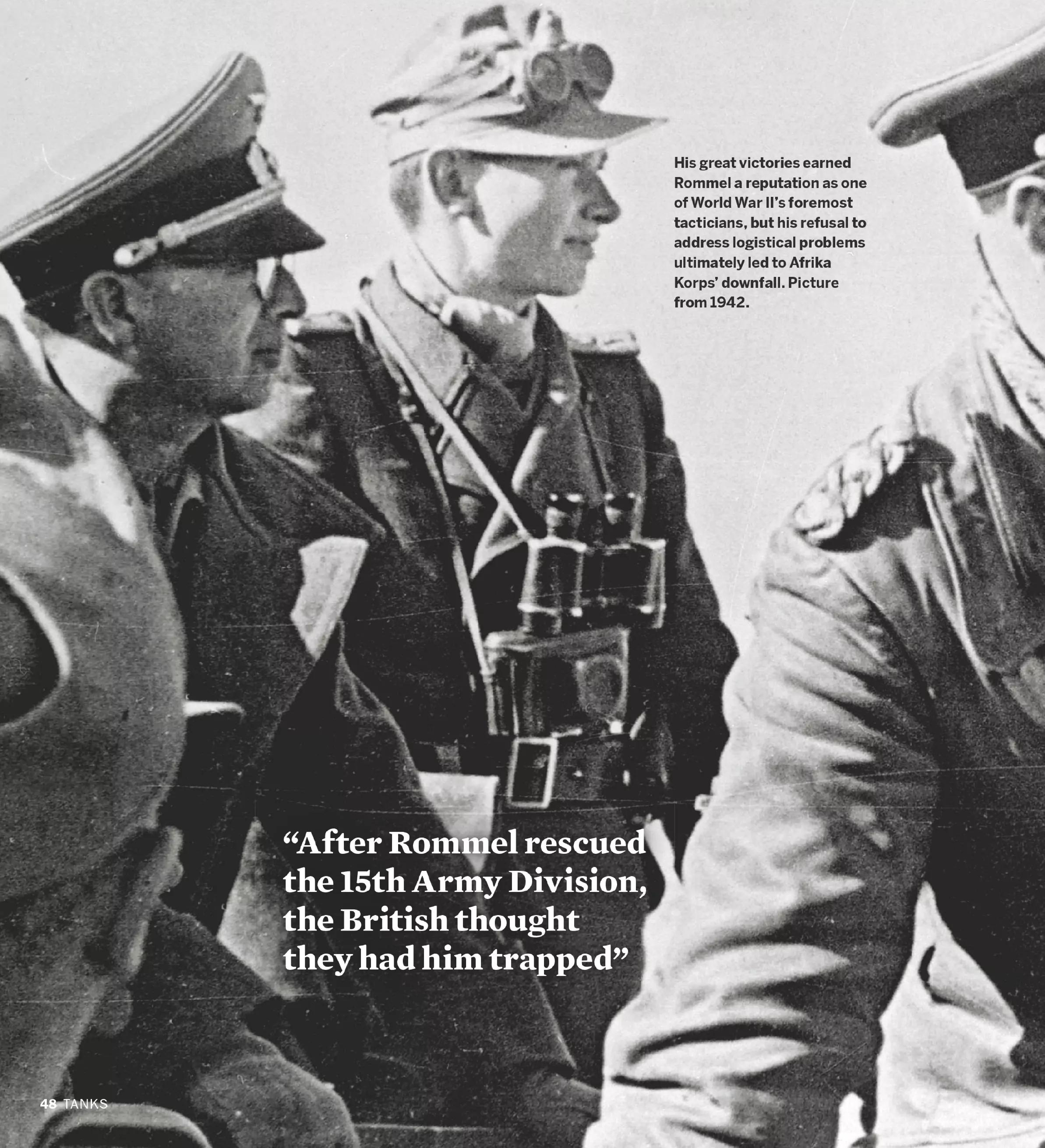
In conclusion, it must be said that those serving in tanks were not men of steel. The situation where four or five men served as different parts of one body in battle was still different from many others.

The circumstances required trust in each other to carry out their specific tasks to the letter. Many were certainly proud to belong to a tank company, and to experience the special feeling when everything worked well, whether in the tank, platoon or company. Tank commander 'Snowie', gunner Ken Tout and the other crew of the British M4 Sherman tank who began this story were quite rightly both happy and proud tank soldiers. ✪

Harald Sonesson is a reserve tank officer and specialist on combat tanks.

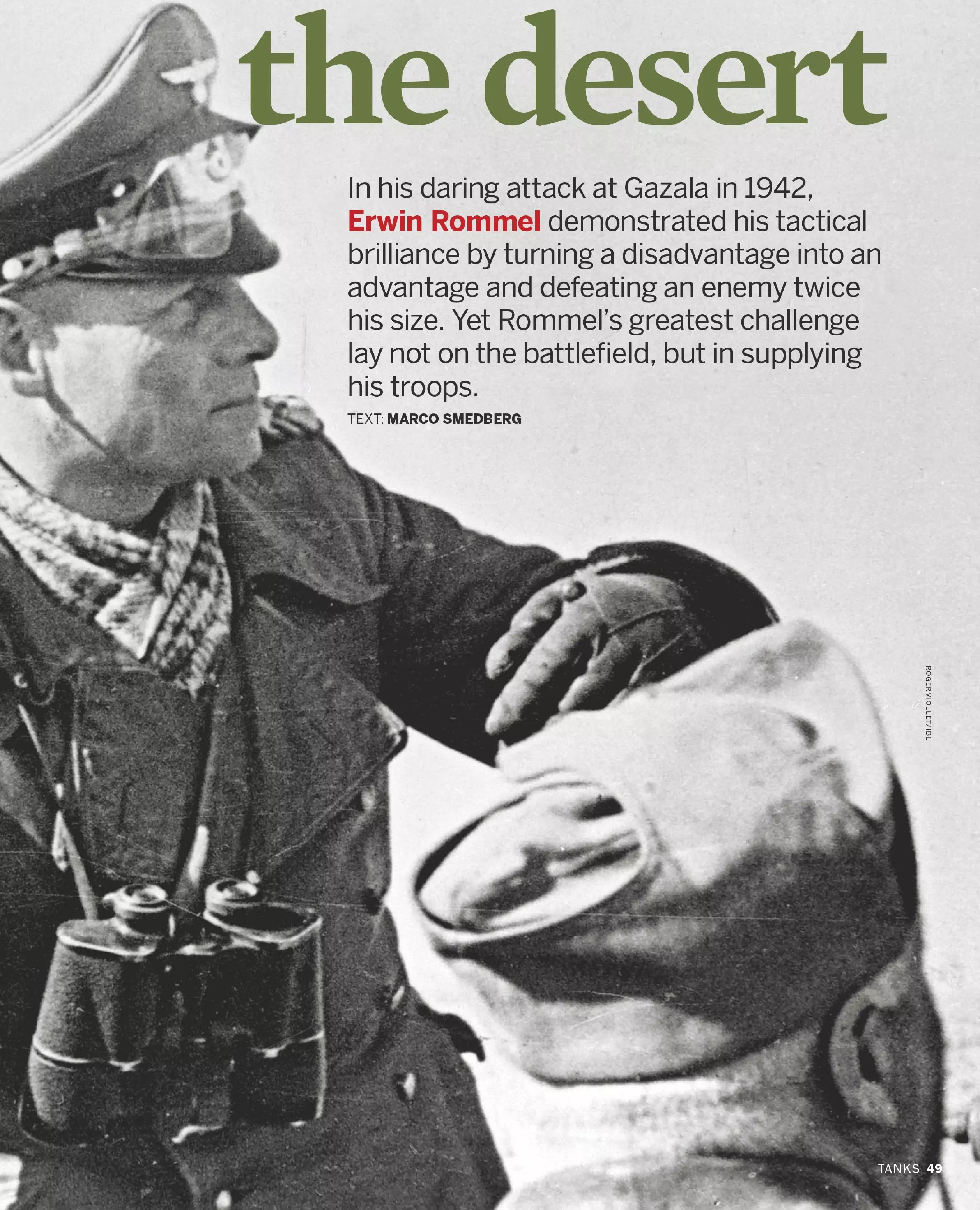
Further reading:
By Tank – D to VE Days (collection 2010) by Ken Tout.
★ **Panzer Tactics** (2005–2008) by Wolfgang Schneider.

Bravado in



His great victories earned Rommel a reputation as one of World War II's foremost tacticians, but his refusal to address logistical problems ultimately led to Afrika Korps' downfall. Picture from 1942.

> "After Rommel rescued the 15th Army Division, the British thought they had him trapped"



the desert

In his daring attack at Gazala in 1942, **Erwin Rommel** demonstrated his tactical brilliance by turning a disadvantage into an advantage and defeating an enemy twice his size. Yet Rommel's greatest challenge lay not on the battlefield, but in supplying his troops.

TEXT: **MARCO SMEDBERG**

ROGER VIOLLET/IBL

By the afternoon of 27th May, 1942, Lieutenant General Erwin Rommel's bold, night-time, flanking manoeuvre around the Allied defensive line at Gazala in North Africa looked like a colossal blunder. Three miles from the coast, the Afrika Korps' troops he was leading were forced to stop. Rommel, the Desert Fox, had fallen into a trap behind the British-led front and now the Germans risked being cut off. His two tank regiments had already suffered 30 percent losses and they were running out of fuel and ammunition.

To make matters worse, the German tank crews had been unpleasantly surprised to discover that the British were reinforced with US M3 'Grant' tanks, which were far superior to their own Panzer IIIs.

At 16.00, 40 British tanks moved from the east, heading for the German staff and supply forces, situated to the south of the main battle line. Only a hasty regrouping of the force's armoured front and some fortuitously available 88-mm anti-aircraft guns saved the Germans from a major defeat.

The following day it was the British who blundered. Instead of using all their tanks to press home their attack against the German supply units, which could have brought an early victory, they switched their attack to less vulnerable targets and the opportunity was lost. Despite the precarious supply situation, Rommel was full of confidence.

Realising that his first plan was no longer viable, the Desert Fox ordered his forces to try to open a supply road through the British defensive line, but he soon found himself caught between two British brigades with his back against Allied minefields. With supplies now dangerously low, Rommel was forced to take up a defensive position– later termed 'the Cauldron' – there on the Allied line. The general was unperturbed: he was a stubborn and brave soldier, and he was at his best when things seemed to be at their worst.

> "Despite the precarious supply situation, Rommel was full of confidence"

Taking advantage of a gap in the minefield that he had noticed earlier, the wily Fox was able to lead a supply column through the Allied defences to help the stranded 15th Armoured Division. It was the 29th May and he had just solved one of many crises during the battle at Gazala.

The Afrika Korps emblem consisted of a palm tree and a swastika.

The attack against the Gazala Line, five miles west of Tobruk, began on the evening of the 26th May under the cover of a sandstorm. While four Italian infantry divisions made a diversionary, frontal attack, three German and two motorised Italian divisions swung around the British south flank. In the moonlit night, almost 10,000 vehicles stole across the desert.

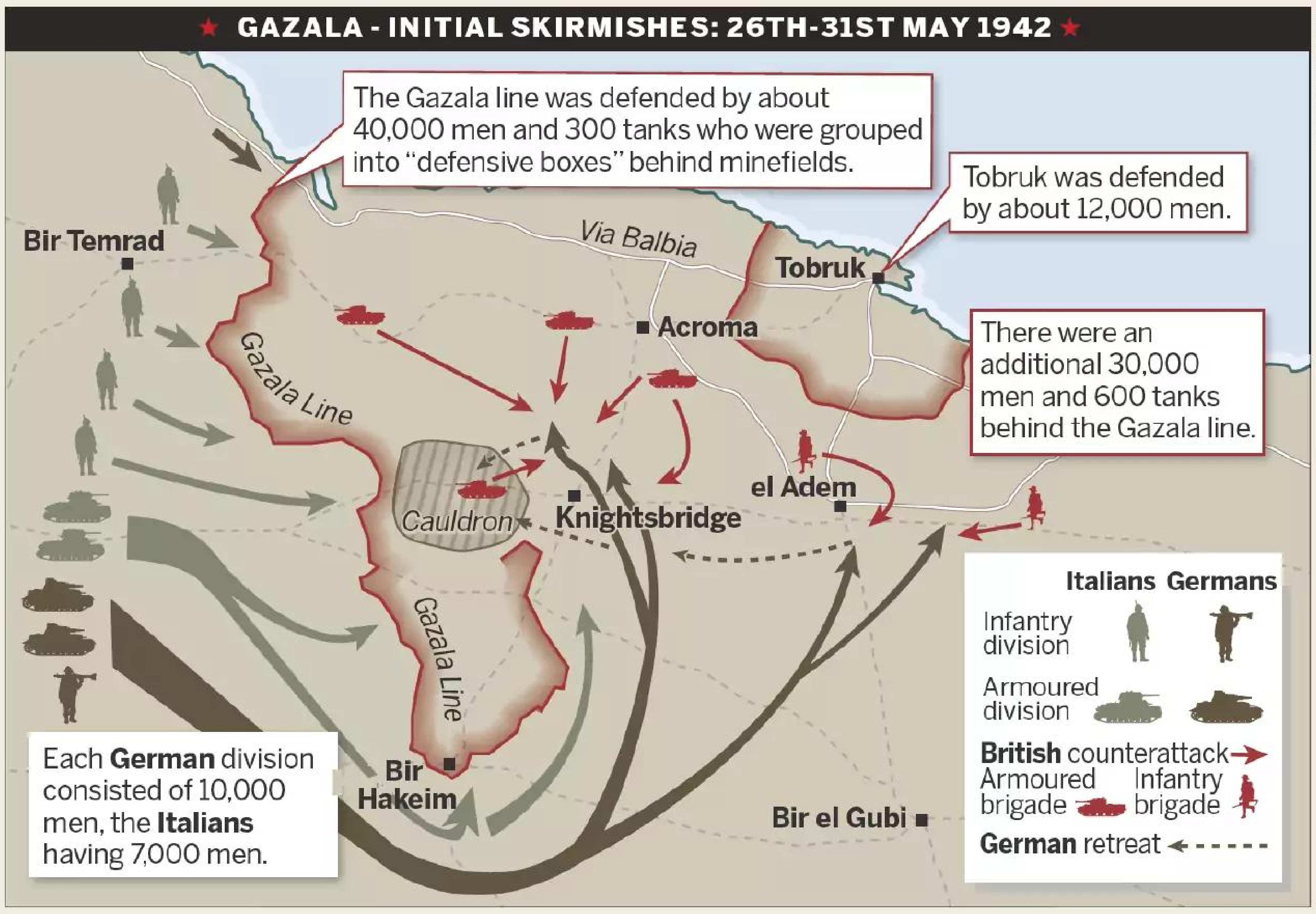
Rommel went with them. The Germans had 270 medium-heavy and 50 light tanks, while the Italians

Rommel risked everything...

★ Rommel launched his offensive at Gazala on 26th May, 1942 with a diversionary attack: four Italian divisions made a frontal assault to occupy as many Allied troops as possible. The main attack started later, under the cover of night, when five divisions circled around the British positions to the south. The goal was to cut the coast road to Tobruk.

The Afrika Korps's advance stopped after a day, partly due to a lack of fuel and partly because Allied counterattacks were threatening to cut them off. In the days that followed, the British repeatedly attacked the Afrika Korps, while the Axis forces attempted to open supply lines through the British Gazala Line.

★ **GAZALA - INITIAL SKIRMISHES: 26TH-31ST MAY 1942** ★



The Gazala line was defended by about 40,000 men and 300 tanks who were grouped into "defensive boxes" behind minefields.

Tobruk was defended by about 12,000 men.

There were an additional 30,000 men and 600 tanks behind the Gazala line.

Each **German** division consisted of 10,000 men, the **Italians** having 7,000 men.

ERIK LINDHOLM

had 240 light tanks. Even combined, the Axis forces were outnumbered by the British, who had over 900 tanks. After two days of fighting, though, that number was halved.

After Rommel rescued the 15th Army Division, the British thought they had him trapped. But their attacks on the Cauldron were hopelessly uncoordinated. The British numerical advantage was steadily reduced as its forces made one ill-fated advance after another against well-positioned anti-tank guns and tanks. In addition, the Germans were more adept at salvaging their damaged units, which helped level the playing field.

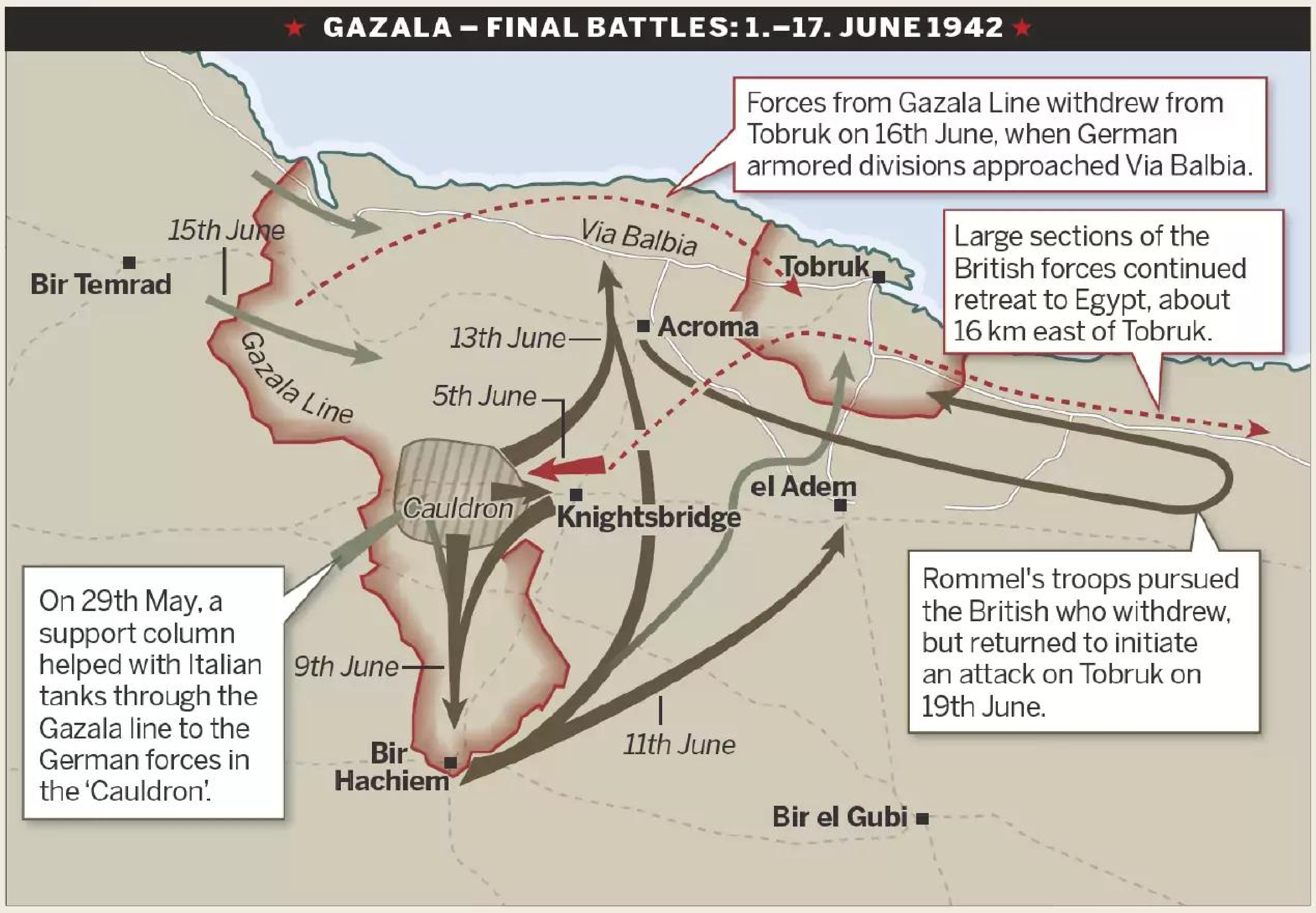
The British defences at Gazala were arranged as a line of 'boxes': fortified and mined encampments that each housed a different unit. It was a strong defensive setup, but it meant that British units could not easily come to one another's aid. This weakness did not escape Rommel's attention and Axis forces were able to attack individual boxes piecemeal, open gaps in the line and instigate supply routes.

Rommel took advantage of every opportunity to hit his opponents on the counterattack, preferably on their flanks where they were weaker. His mobility in battle kept his enemies guessing and it was a tactic that Rommel mastered better than any of his opponents. Unlike his British counterparts, Rommel led his forces from the front, shouting orders from his vehicle. This meant that his men were able to engage in combat more quickly. ▶

ULLSTEIN/IBL

Rommel (second on the left) led from the front and was able to issue orders quickly as the situation changed. Here he's seen in a Sd. Kfz 250/3 outside Tobruk in the middle of June 1942.

... and won the battle of Gazala


★ GAZALA – FINAL BATTLES: 1.–17. JUNE 1942 ★

Forces from Gazala Line withdrew from Tobruk on 16th June, when German armored divisions approached Via Balbia.

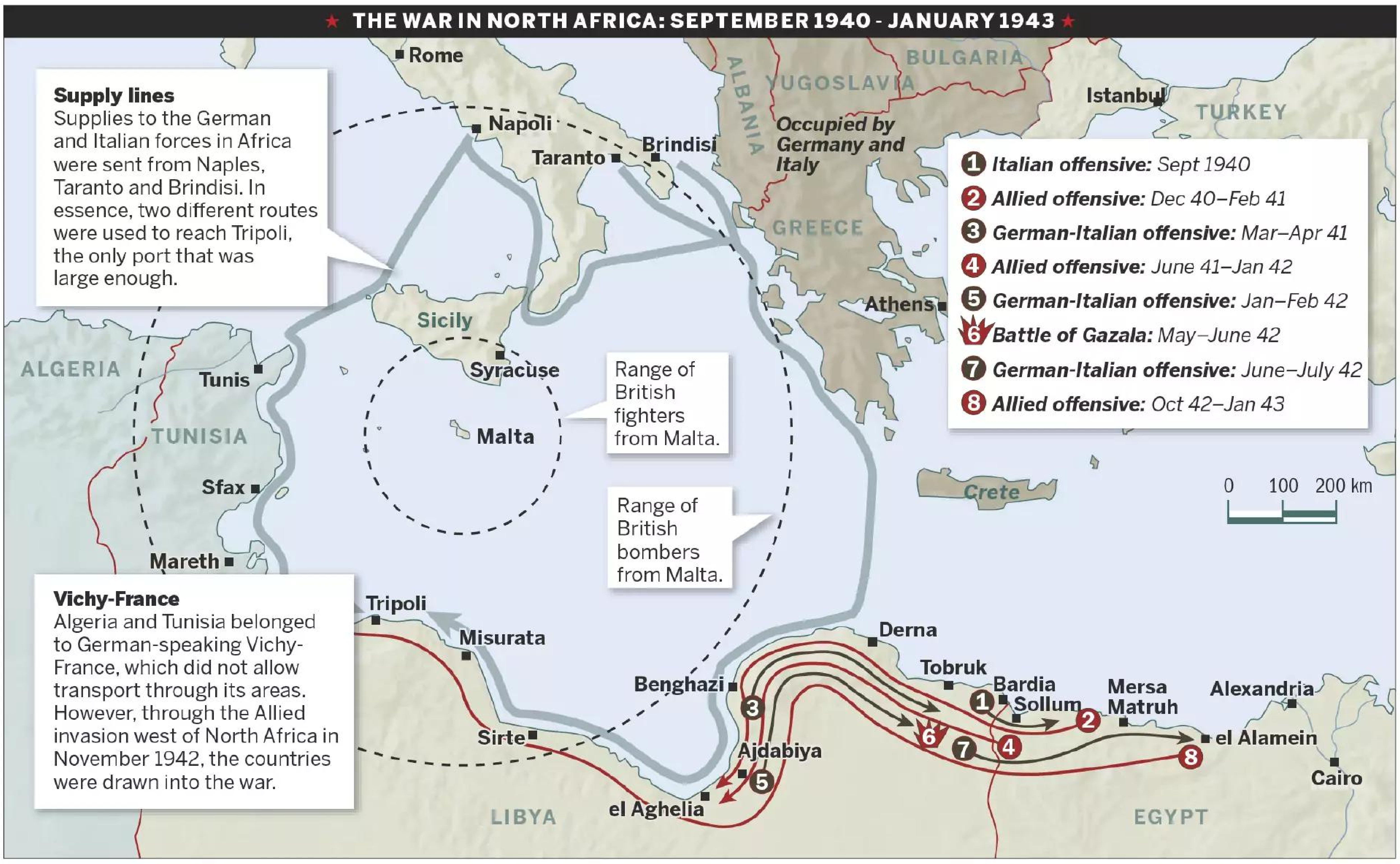
Large sections of the British forces continued retreat to Egypt, about 16 km east of Tobruk.

On 29th May, a support column helped with Italian tanks through the Gazala line to the German forces in the 'Cauldron'.

Rommel's troops pursued the British who withdrew, but returned to initiate an attack on Tobruk on 19th June.

★ On 5th June, the British attacked the Germans again, but Rommel's forces had now received new supplies, and took the initiative with a counterattack against the British 'Knightsbridge' encampment. More provisions followed and on 9th June, Rommel sent two divisions against the Allies' most southerly stronghold, 'Bir Hakeim'. The defenders resisted for two days before withdrawing. Having secured his supply lines and knowing that his left flank was protected by the Allies' minefield, Rommel shifted his attack to the north. The British forces began to fall back towards Tobruk on 14th June. The Germans and Italians pursued them briefly, but then returned to attack Tobruk on 17th June.

★ THE WAR IN NORTH AFRICA: SEPTEMBER 1940 - JANUARY 1943 ★



Supply lines
Supplies to the German and Italian forces in Africa were sent from Naples, Taranto and Brindisi. In essence, two different routes were used to reach Tripoli, the only port that was large enough.

Range of British fighters from Malta.

Range of British bombers from Malta.

Vichy-France
Algeria and Tunisia belonged to German-speaking Vichy-France, which did not allow transport through its areas. However, through the Allied invasion west of North Africa in November 1942, the countries were drawn into the war.

① ***Italian offensive:*** *Sept 1940*
② ***Allied offensive:*** *Dec 40–Feb 41*
③ ***German-Italian offensive:*** *Mar–Apr 41*
④ ***Allied offensive:*** *June 41–Jan 42*
⑤ ***German-Italian offensive:*** *Jan–Feb 42*
⑥ ***Battle of Gazala:*** *May–June 42*
⑦ ***German-Italian offensive:*** *June–July 42*
⑧ ***Allied offensive:*** *Oct 42–Jan 43*

ERIK LINDHOLM

British planes and subs based at Malta were a constant threat to the Axis' supply shipments across the Mediterranean.

"He was in his element in fast-moving combat where he could exploit unfolding situations"

▶ British generals, by comparison, lost valuable time interacting with one another behind the front line.

On 12th June, the three remaining British armoured brigades came under attack and suffered huge losses. The following evening, Rommel moved north. A brave South African anti-tank battery fought to its last gun to help its compatriots escape, but it wasn't enough to prevent the high ground it was defending, Rigel Ridge, from falling into the Axis' hands.

Now the Germans were in sight of Tobruk and able to threaten the coastal road, while the British forces still on the Gazala Line were in danger of being cut off.

The Allies began to retreat on 14th June. The Afrika Korps' advance north was hampered by minefields and fatigue. In fact, many of the German crews were so tired that they fell asleep as soon as the tanks stopped at nightfall. As a result, many of the Allied forces managed to escape, but the road to Tobruk and Egypt was now open.

Gazala was a decisive German victory and a good example of the Desert Fox's offensive tactics. The British had long experience of desert war and had encountered no problems fighting the Italian forces. The Afrika Korps was altogether more troublesome, even when the British had significantly greater numbers.

The biggest factor in the Germans' favour was their speed. The Allies simply couldn't keep up. British attacks were carefully planned and methodically conducted in a way that left little room for initiative in the field.

In addition, British brigades usually fought as separate units, which was a serious disadvantage against the Germans who regularly massed their tanks for battle. In short, the British army was not prepared for modern mobile warfare.

It also had an unusually formidable adversary in Rommel. An experienced leader, he was in his element in an arena of fast-moving combat where he could swiftly exploit unfolding situations. He also had an unusual ability to predict his opponents' actions, an advantage he'd always tried to use to since World War I. He also frequently chose to go on the offensive in battles, often using

Afrika Korps' uniform cap.

bold and surprising flank attacks to force his opponents to counter his moves.

His tactical genius brought him the admiration of his troops and the wider German public. Even the British respected him. The Italians were less enamoured, however, believing that he treated them with condescension.

Tactical brilliance is not all in war – particularly in a desert campaign – and there were other factors that Rommel did not handle so well.

Battle in a desert imposes great demands on the combatants' logistical frameworks: troops are unable to scavenge for even basic necessities, such as water – and are wholly dependent on provisions being supplied from elsewhere. In this, the British had a great advantage because they could ship supplies around Africa, beyond the reach of the Luftwaffe, and through the Suez Canal to their main base in Alexandria.

The Axis, on the other hand, were forced to ship supplies across the Mediterranean from southern Italy to Tripoli in Libya, their main port in North Africa. The Mediterranean transports were constantly threatened by the Royal Navy and the RAF who were stationed at Malta.

Those supplies that made it across the Mediterranean still had a long journey to reach the troops. It's 1,000 kilometres from Tripoli to Benghazi – the same distance as Moscow is from the German border – and as the Axis forces advanced, the lines stretched ever further, Alexandria being a further 1,000 kilometres beyond Benghazi. There was nowhere along the rest of the coast, including the harbour at Tobruk, that was suitable for landing supplies and there was no railway that could convey provisions. All the supplies, including fuel, ammunition and water, had to be driven by lorries along the coast road.

To make matters worse for the Germans, their transports were vulnerable to air attack during the day and their vehicles suffered in the desert climate, almost halving their lifespans.

The Italians had around 7,000 trucks, while Afrika Korps had 3,000 – ten times more than those possessed by German forces at the start of their attack on the Soviet Union. But it still wasn't enough. Rommel's armoured divisions each claimed about 100 tonnes of supplies each day, and a further 100 tonnes in battle. Add to that provisions for German reserve units and five Italian divisions and they were left with a transport requirement of around 50,000 tonnes per month.

This figure was manageable providing that they didn't go on the offensive. Capturing new territory meant extending the supply lines, which increased the wear and tear on the trucks. Sadly, for the Axis' quartermasters, Rommel wasn't one to stay put and he stretched the lines to the point that an additional 12,500 trucks were required to supply the German-Italian offensive, 25 percent more than they had. Rommel's solution was to ignore the problem.

At the end of 1940, British and Commonwealth forces launched Operation Compass, the first major action of the Western Desert Campaign. Within two months, the Allies had eliminated Italy's 10th Army and captured Egypt. Fearing that Mussolini would lose all Italy's North African territories, Hitler sent support in the shape of the newly formed Afrika Korps in early February 1941. Initially, only the 5th Light Division disembarked in Libya and Rommel had to wait until May for the 15th Panzer Division to arrive.

The German General Staff had previously stated that four armoured divisions were needed to defeat the British. However, to field that number of units, the Italian forces would need to be withdrawn because otherwise they would consume the supplies ▶

Rommel sits on the tank's turret in the open desert terrain. The picture shows a German Panzer III Ausf. G. The crew has improvised additional armour by hanging spare tracks and wheels across the front of the hull.

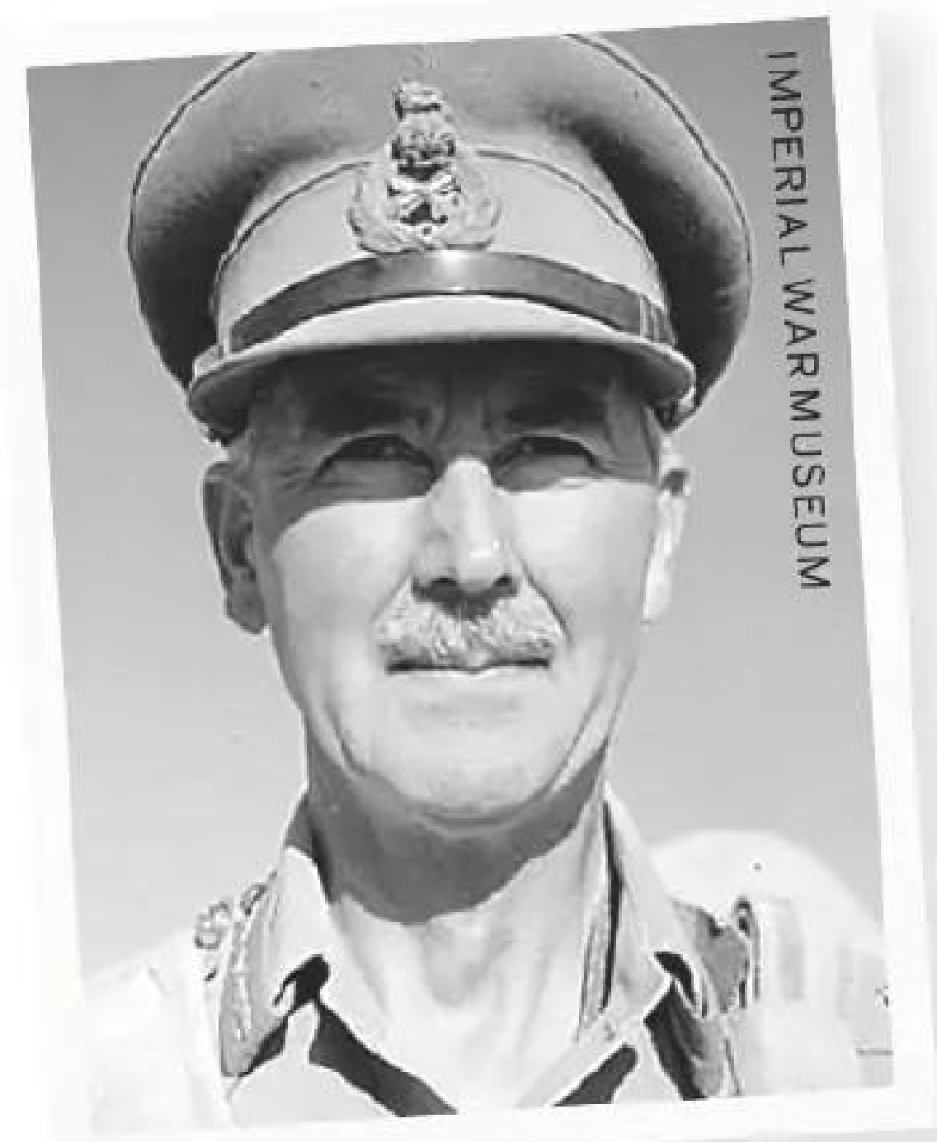
SCHERL/SZ PHOTO/IBL

A German lorry column on Via Balbia, the coast road to Tobruk, climbs a hill outside Derna in May 1941. The further the Germans advanced, the more difficult it was to supply them. It was an inconvenient truth that Rommel virtually ignored.

ULLSTEIN/IBL

required by the new German divisions. Mussolini would have baulked at such a solution, though, so the plan was put on ice. Instead, Germany sent the relatively weak Afrika Korps, expecting it to be used for defence. Rommel chose to attack instead.

He launched his first offensive on 24th March, 1941 with the 5th Light Division supported by two Italian Divisions. The British, who had been weakened when they sent reinforcements to Greece, retreated. Despite the paucity of his resources, Rommel decided to try to capture the entire eastern coastal region of Libya. The head of the 5th Light Division, Lieutenant General Johannes Streich, claimed that their vehicles needed to be adapted before they could advance further. Rommel refused to listen, later commenting that "one cannot permit unique opportunities to slip by for the sake of such trifles".



IMPERIAL WAR MUSEUM

Alan Cunningham was briefly commander of the British Eighth Army.

Rommel's forces quickly captured Benghazi and, ignoring headquarters' warnings against making further advances, he laid siege to Tobruk on 11th April. Three days later he was at the Egyptian border.

The port city of Tobruk was at the centre of the North Africa theatre of war. The city was defended by 25,000 men from British and Commonwealth forces and could be reinforced from the sea. Impatient for success, Rommel threw a series of small-scale attacks at the stronghold. The result was failure and an unnecessary loss of life.

But Rommel now had other problems, too. His unsanctioned advance had put a critical strain on the supply lines. Even if enough provisions could be shipped to Africa to satisfy Afrika Korps' requirements, Rommel's force had now reached such a distance from Tripoli that they were at the limit of the logistical supply route. To make matters worse, the Italians attempted to prioritise supplies to their own forces, which aggravated the strained relations between the Germans and Italians.

When Rommel asked for reinforcements, headquarters replied that all available resources were required for the forthcoming attack on the Soviet Union and that it was, in any case, impossible to effectively provision more German forces in North Africa. Disappointed, Rommel ordered a new attack on Tobruk on 4th May. Once again, the attack failed. Two major counterattacks by the British – Operation Brevity in May and Operation Battleaxe in June – attempted to break the siege, but the Axis forces held firm and the front stabilised.

In August 1941, the Axis commanders changed the organisational structure in North Africa and Rommel became the head of *Panzergruppe Afrika*. This consisted of the Afrika Korps, which now included the 15th and 21st Panzer Divisions (the latter being a reorganised version of the 5th Light Infantry Division that had been upgraded to a full-fledged armoured division), the newly arrived German 90th Light Division, plus six Italian divisions: four infantry, one motorised and one tank division.

The British also strengthened their forces, which now comprised two army corps from the newly formed Eighth Army under the command of General Alan Cunningham. Thanks to better supply routes, the British were able to reinforce more rapidly than the Germans.

On 18th November, the Allies launched Operation Crusader, sending 770 tanks into an attack to relieve Tobruk's defenders. Rommel countered with just 414 tanks, but still won the battle.

Increasingly desperate, the British threw their tank brigades forward, but Rommel skilfully parried their attacks, using his numerically inferior forces in effective counterattacks. Having lost around 500 tanks, the British were forced to call off their attack.

Rommel wanted to press his advantage, but he knew his force was too small to do any real damage unless the British retreated. Initially, they did just that. But Cunningham's commander, General Claude Auchinleck, countermanded the order and replaced Cunningham. With only 100 operational tanks that were being driven ever further from their supplies, increased British resistance and ever more effective air strikes against German forces and their supply columns, Rommel was forced to disengage.

In practice, Afrika Korps was cut off. Even Rommel was forced to face the problem this time and ordered the retreat. The siege of Tobruk had been lifted. By 30th December, the Germans were back in El Agheila where they had started in March. However, German supply lines were now less stretched, while the problems facing British quartermasters increased.

Rommel demanded reinforcements, including 8,000 lorries, but headquarters refused. Their focus was on the campaign in the east, where four armoured armies shared a total of 14,000 lorries. Rommel was forced to make do with more modest reinforcements, including 55 new tanks that arrived at the beginning of January 1942. Undeterred, he planned a new offensive. On 21st January he went on the attack with the renamed *Panzerarmee Afrika*.

> **"Rommel attacked the Gazala Line and turned what seemed to be a hopeless position into an advantageous point of attack"**

In response, the British drew back to Gazala and Tobruk. Thanks to the Luftwaffe's efforts over Malta, more supplies were reaching Rommel's forces and both sides began preparing for a summer offensive.

On 26th May, Rommel attacked the Gazala Line and turned what seemed to be a hopeless position into an advantageous point of attack. After a busy week of hard fighting, the British began to retreat. Rommel chased them in the hope that he could capture Tobruk before they had the chance to organise a proper defence.

This time the Germans succeeded. As soon as they arrived at the city, they conducted a powerful and well-coordinated attack. Tobruk fell on 21st June. The German's took 33,000 men captive and gained valuable supplies. It was Britain's biggest setback since losing Singapore in February. Rommel was rewarded with the rank of field marshal.

Rommel knew that the British were shaken. The Allies feared that a successful Rommel coming from Egypt could threaten the valuable British oil resources in the Middle East or even join with German forces attempting to take the oil fields in the Caucasus. Rommel was keen to attack again before the Eighth Army was able to reorganise, but Tobruk's port wasn't big enough to allow him to extend his supply lines.

His choices were either to continue and attempt to conquer Alexandria or fall back to Tripoli. Staying ►

Forced to take his own life

★ Erwin Rommel's reputation was founded during World War I, during which he was awarded Pour le Mérite, Germany's highest honour for courage in field. After the war, Rommel documented his experiences in the book *Infanterie Greift An* (*Infantry Attacks*), published in Germany in 1937. During the campaign in Poland, Rommel led Hitler's personal guard before taking command of the 7th Panzer Division in France in 1940. After Africa, he was appointed head of Army Group B in France. His task was to defend Normandy in June 1944. Implicated in the plot to assassinate Hitler, Rommel chose to take his own life on 14th October, 1944, thereby protecting his family from the repercussions of his being tried and executed for high treason. He was given a state funeral as part of a Nazi propaganda campaign.

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Rommel gives orders at Gazala in May 1942.

Troops would often fly to North Africa while all materiel had to be shipped via the sea. The small ports on the North African coast were a bottleneck for supplies. In this photo, a Carro Armato M13 / 40 Italian tank is being unloaded at the docks in Tripoli.

ULLSTEIN/IBL

put in Tobruk wouldn't achieve anything. Rommel chose to continue the offensive.

Meanwhile, Italian high command wanted to neutralise Malta's influence to secure the Mediterranean supply route and proposed that the Luftwaffe should support an Italian attack on the island. Field Marshal Albert Kesselring, head of German Luftwaffe forces in the Mediterranean, supported the idea and pleaded with Rommel to delay his offensive until the Italians had dealt with the threat from Malta, arguing that he could then direct all the Luftwaffe's limited resources to supporting the advance across the desert. But Hitler said no to Malta, and supported Rommel, who, in turn, hoped that the supplies he'd captured in Tobruk would be enough to get his men to Suez.

Rommel set off on 22nd June. Initially, his forces faced little resistance from the British, but that was about to change. General Auchinleck established a new Allied line of defence at El Alamein, between the sea and the cliffs edging the Qattara Depression, an area of impassable salt marshes.

On 1st July, Rommel reached the new British line and there he stayed there for the next 26 days as the two forces exchanged hostilities. This was the First Battle of El Alamein and it ended in a stalemate.

The German supply lines were now stretched to breaking point and only small reinforcements were reaching the front. On the British side, General Bernard Law Montgomery had just assumed command of a well-provisioned Eighth Army. Rommel realised that he was at risk of losing.

On 30th August, he tried to attack the British from Alam el Halfa, south of El Alamein. The battleground lacked elbow room, however, and so the attack was abandoned. The British organised a counterattack. The ensuing battles ran for two days; the Germans lost 3,000 men, 50 tanks and as many guns. Worse, they also lost 400 trucks, which further weakened Rommel's supply line. This time the British losses were lower than the Germans'. Allied air strikes were changing British fortunes.

In September, an exhausted Rommel returned to Germany to recuperate. After a period spent regrouping and retraining his troops, Montgomery's Eighth Army launched a major offensive on 23rd October. In the Second Battle of El Alamein, the British took a week to break their opponent. Rommel, who returned just after the battle had begun, did all that he could to stop a British breakthrough, but with ever fewer tanks, dwindling supplies of fuel and ammunition, and without cover against RAF air strikes, the situation soon became untenable.

On 4th November, the British broke through and Rommel ordered a retreat. Only the fully motorised forces got away. Most of the Italian infantry was captured. Rommel's remaining forces conducted an orderly withdrawal, occasionally fighting delaying actions to win time for slower units to catch up. The retreat finally halted in Tunisia where the 10th Panzer Division had arrived to reinforce the country following the Allied invasion of Vichy-French-held territories in Morocco, Oran and Algiers.

The invasion sparked the Axis' occupation of Vichy France and the capture of the French fleet. It also enabled them to transport supplies from Toulon in France to Bizerta in Tunisia, strengthening their bridgehead into Tunisia in a way that Rommel could only have dreamed about. It was too late, though. The Allies' naval and air superiority meant that it was increasingly difficult for the Axis' powers to get supplies to Africa by any route. In March 1943, Rommel was replaced and left Africa. Two months later, the Axis' forces surrendered in Tunisia.

"The desert is often referred to as 'a tactician's paradise – but a quartermaster's hell'"

Bernhard Montgomery defeated Rommel at El Alamein.

The desert is often referred to as "a tactician's paradise - but a quartermaster's hell". Rommel and his Afrika Korps seemed determined to prove this. Thanks to his bold offensive tactics, he won many battles, but ultimately it counted for little as the supply situation made it impossible for him to hold the territory he took.

Malta neutralised the Luftwaffe, but the lack of a decent port on the North Africa coast was a greater obstacle. When the Second Battle of El Alamein raged in October, much of Germany's resources remained stuck in Benghazi, 100 miles away.

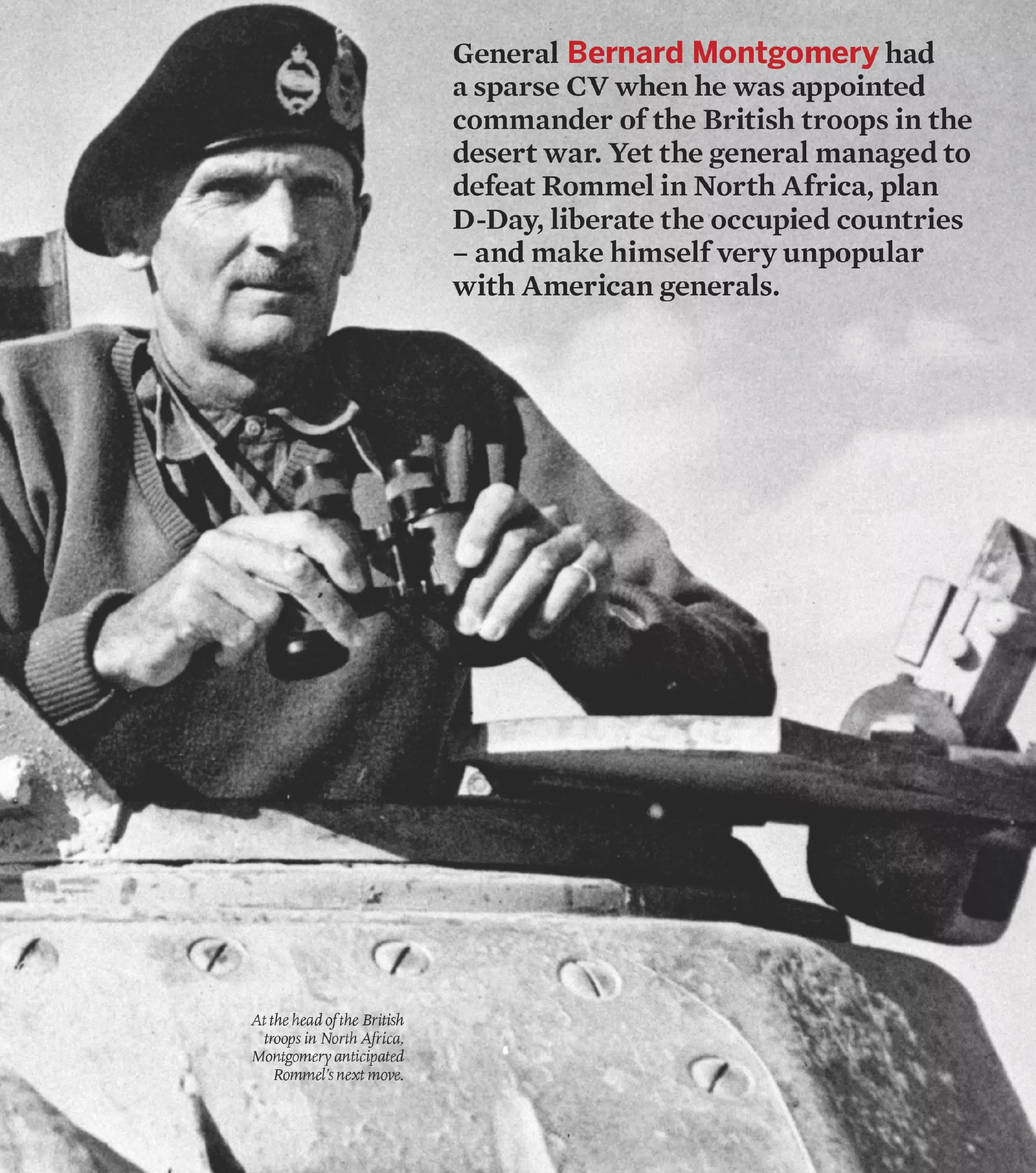
Rommel constantly complained that he did not get reinforcements, but he wouldn't have been able to supply them even if they'd been sent. A radical solution would have been to replace the Italian forces with an equivalent number of German divisions that had the tactical ability required to capture Egypt. This would have ensured there was no shortage of supplies, but the Germans could not afford to offend their allies with such a demand.

All in all, the original German plan to defend Italian-held North African territories with a limited force was the best solution. The defeat that followed was largely a result of Rommel's refusal to stick to the plan and his naïve strategy of capturing territories he wasn't equipped to hold.

Marco Smedberg is a military historian.

Further reading:
- **Panzer Battles** (1956) by Friederich von Mellenthin.
- **Supplying War – Logistics from Wallenstein to Patton** (1977) by Martin van Creveld.
- **Rommel: The End of a Legend** (2005) by Ralf Georg Reuth.

NOVICE FORGED AHEAD ON THE BATTLEFIELD



General Bernard Montgomery had a sparse CV when he was appointed commander of the British troops in the desert war. Yet the general managed to defeat Rommel in North Africa, plan D-Day, liberate the occupied countries – and make himself very unpopular with American generals.

At the head of the British troops in North Africa, Montgomery anticipated Rommel's next move.

North Africa, 1942

The Allies are hard-pressed: so far, the war in the desert had consisted of one long series of lost battles, and in Britain Winston Churchill craved a win. He changed his military leadership in the Desert War – for lack of anyone better, Churchill settled for the untested and awkward officer Bernard Law Montgomery.

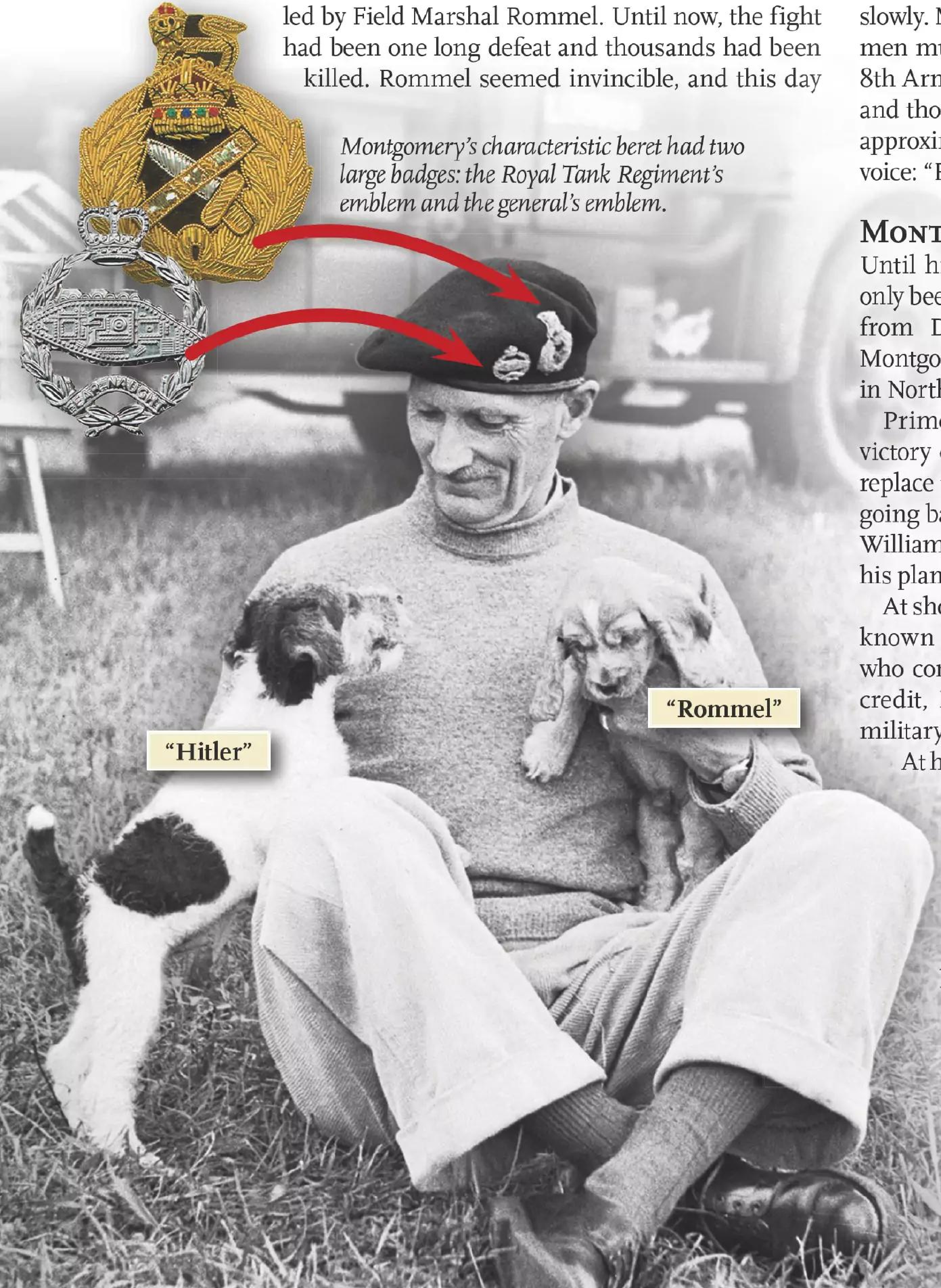
SIT DOWN!” BARKED THE COMMAND, as a slender man with a pointed face went before the barracks, staring at the sun-tanned officers of the British 8th Army. The man introduced himself as Bernard Montgomery, and in a squeaky voice he presented a military strategy to his officers.

The 50-60 assembled men had no great expectations for the meeting with the army's new commander. For over a year, the British fought against the German Afrika Korps led by Field Marshal Rommel. Until now, the fight had been one long defeat and thousands had been killed. Rommel seemed invincible, and this day – 13th August, 1942 – had been a scorching, depressing one in the Egyptian desert.

“Here we will stand and fight; there will be no further withdrawal. I have ordered that all plans and instructions dealing with further withdrawal are to be burnt”, said Montgomery as the officers gaped.

“If anyone objects to doing what he is told, then he can get out of it”, continued the general. Nobody left.

As the minutes passed, the soldiers' confidence increased slowly. Montgomery ordered that over the next few weeks all men must exercise and take shooting practice, and that the 8th Army be reinforced with 300 American Sherman tanks and thousands of fresh British soldiers as the army reached approximately 220,000 men. Finally Montgomery raised his voice: “Rommel and his army will be turned out of Africa!”



Montgomery's characteristic beret had two large badges: the Royal Tank Regiment's emblem and the general's emblem.

At headquarters Montgomery had pets. Two were named after the general's worst enemies: a fox terrier called Hitler and a cocker spaniel called Rommel.

MONTGOMERY CAME WITH A REPUTATION

Until his appointment in 1942, Bernard Montgomery had only been noticed because he successfully got men home alive from Dunkirk in 1940. For 54-year-old Bernard Law Montgomery, the role as Commander of the British 8th Army in North Africa was the chance of a lifetime.

Prime Minister Winston Churchill desperately needed a victory over the Nazis and decided in the spring of 1942 to replace the military leadership in Africa where the fight was going badly. Churchill's first choice for the post was General William Gott, but Gott died a few weeks before starting, when his plane was shot down by the Germans near Cairo.

At short notice, the job then went to Bernard Montgomery, known as an uncharismatic person and a troublemaker who constantly punished those who disobeyed him. To his credit, Montgomery was also reputed to be a competent military theorist.

At his first meeting with Churchill, Montgomery refused the offer of both cigar and drinks from the jovial Prime Minister after dinner, and Churchill had to find plausible arguments when he later defended Montgomery's appointment as the new British Commander in the desert war:

“While he is uncomfortable to his surroundings, he will also be uncomfortable to the enemy”,

Three battles made Montgomery's career

Operation Lightfoot made Montgomery's reputation as newly appointed General and was an important victory in the Desert War. Riding on a wave of success, Montgomery planned D-Day – but as his forces subsequently reached Holland, he became overconfident.

EXPERIENCES FROM THE BATTLEFIELD

D-Day — France

6th June, 1944: 150,000 Allied troops go ashore on the beaches of Normandy in the largest landing operation in history – and Montgomery is in overall command. He'd been in London planning the operation in which a veil of misinformation misled the Germans, so the Allied Forces could enter France undisturbed.

On D-Day, Montgomery had to work with US generals.

NORMANDY
ARNHEM
EL-ALAMEIN

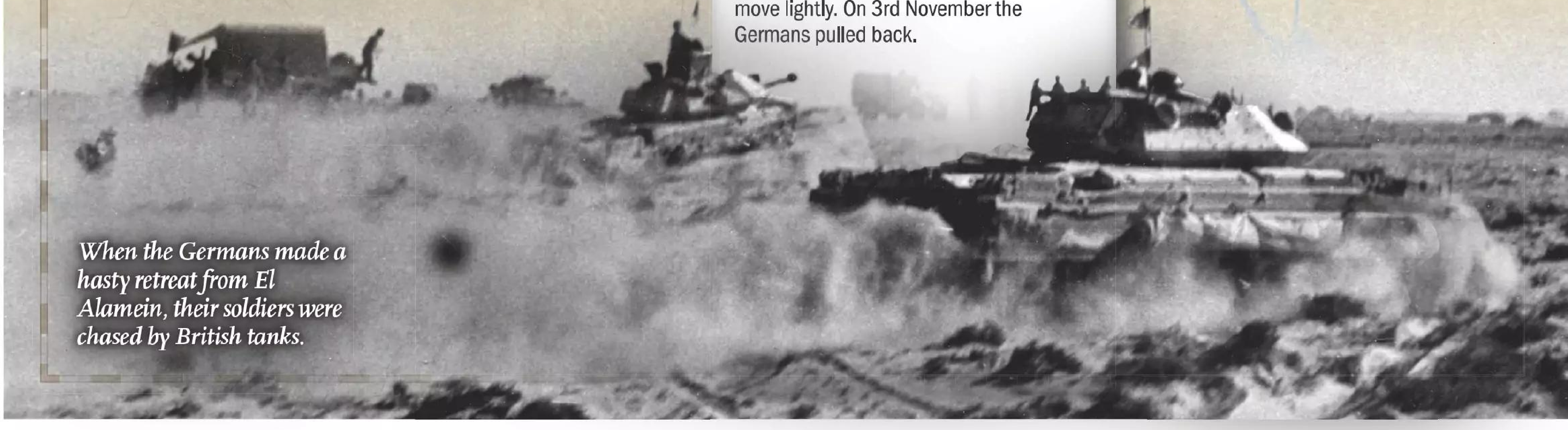
Operation Market Garden — Holland

17th September, 1944: Montgomery's biggest failure comes when he ignores warnings about SS divisions and inserts 35,000 paratroopers into Holland. Around 6,600 to 9,000 men were captured or killed in the area around Arnhem.

35,000 paratroopers participated in Operation Market Garden.

Operation Lightfoot — Egypt

23rd October, 1942: Allied forces launch a violent bombardment along the entire front line at El Alamein. After three days, the British advance through the area that gave the operation its name: a minefield eight kilometres wide required soldiers to move lightly. On 3rd November the Germans pulled back.



When the Germans made a hasty retreat from El Alamein, their soldiers were chased by British tanks.

explained Churchill to a sceptical audience who had to accept the Prime Minister's choice of commander.

THE DUEL WITH ROMMEL BEGINS

Two weeks after Montgomery's accession, British soldiers were awakened by flashes of light and the sound of a hollow boom that echoed through the North African desert. In the moonlight the soldiers could see Rommel's Panzer division rolling toward the British positions at Alam Halfa, south of the key city of El Alamein. An officer ran to Montgomery's tent to say that the Germans were coming, and that the British forces should counter-attack.

But when the officer shook the General to life, and Montgomery heard the message, he simply said, "Perfect! It could not be better!" He then quietly settled down again while the officer stared incredulously at the sleeping general.

Ever since Montgomery took command of the 8th Army, he was convinced that Rommel would try to attack Alam Halfa and go from there to El Alamein. Therefore, Montgomery spent his efforts consolidating Alam Halfa. The order was that British forces should stand firm and under no circumstances be lured into open terrain where soldiers would be easy prey for German guns. If the Brits stuck to their strategy, Montgomery considered there wouldn't be any problems and could go back to sleep.

Montgomery was right: six days of Rommel's tank divisions banging away at ▶

> **The 220,000-strong British Army attacked the Germans at El Alamein in 1942. After 10 days of fighting, the British effectively sent the German troops on the run.**

▸ Alam Halfa failed to dislodge the British from their position. In contrast, British Royal Air Force bombs rained down on the Germans and finally Rommel withdrew his armoured troops.

The relatively small strike was a huge moral victory for the British, who for the first time had got one over Rommel. Meanwhile, the battle was an important strategic victory for Montgomery, who had accurately predicted Rommel's plan.

THE TIME FOR VENGEANCE IS NIGH

The Battle of Alam Halfa was only a taster: now the real showdown would begin.

On the evening of 23rd October, 1942 stillness settled over the desert. From a viewpoint slightly outside of El Alamein, Montgomery sat in the twilight with staff officer Freddie de Guingand. The next few hours would be crucial to developments in the Desert War.

Montgomery was ready to meet his fate on the battlefield. Exactly 28 years earlier, during WWI in the autumn of 1914, he had lain in a trench at the Franco-Belgian border, when the command rang out: "Attack!" With his small battalion, Montgomery stormed toward the German positions in what he later described as "a hail of bullets from rifles and machine guns and a veritable storm of shrapnel".

Montgomery ran first, but did not get far – after only a few metres he stumbled over the sword that hung from his uniform's belt. When the future war hero finally got to his feet, he discovered that the soldiers around him had all been killed.

Shortly after, Montgomery was hit by a bullet in his chest and collapsed in the middle of the battlefield. One of Montgomery's fellow soldiers tried to help him to safety, but was himself shot in the head. Montgomery lay for hours stock-still in no man's land, with a dead comrade on top of him.

28 years later, when Montgomery stood at El Alamein, the hour of vengeance had come. At exactly 21.25, the general gave the signal for Operation Lightfoot to start and a devastating artillery bombardment was set in motion. One and a half hours later, 680 British guns had fired a thundering shower of bullets down on the German positions, after which the British infantry advanced.

The Germans were completely unprepared for the attack. Rommel had even given himself leave. After 10 days of intense bombardment on 2nd November, the first British units complemented by Australian, South African and New Zealand forces penetrated through the German defensive lines. German tanks provided stiff resistance at first, but eventually the remnants of Rommel's army were forced to make a rapid retreat to the west.

The Allied victory was completed when German General von Thoma was captured and taken to British headquarters. Montgomery invited the general to dinner, while the cannon roar could still be heard in the distance. "He's a very nice chap

{ **Lightfoot** was the code name for the operation that was Montgomery's first battlefield success. It was also a decisive defeat for the Germans in North Africa.

NAME **ERWIN ROMMEL**

TITLE GENERAL OF GERMAN PANZER DIVISION

1891-1944

Desert Fox teased Brits

Before Montgomery and Rommel stood face to face in North Africa, the German general had already tasted victory as a commander the 7th Armoured Division during the invasion of France in 1940. Rommel continued his success when in 1941 he became commander of German and Italian troops in North Africa, where he seemed impossible to defeat. The Desert War gave General Rommel a reputation as one of the most competent commanders of Armoured Divisions in WWII – and the nickname of Wüstenfuchs, "Desert Fox".

The fox was not quite as shrewd as General Montgomery however, who first in the Desert War and later in Normandy on D-Day beat the German forces. Despite his defeats, Rommel remained one of Adolf Hitler's favourite generals.

At the end of the war, Rommel, was implicated in the failed assassination of the Third Reich leader on 20th July, 1944. Rommel's life ended when Hitler forced the general to commit suicide.

- **Received the German Order Pour le Mérite in WWI.**
- **Responsible for the Atlantic Wall, stretching from France to northern Norway.**

The Italian general's caravan was luxuriously decorated with a living room and marble bathroom.

and keen to talk about the recent events", Montgomery noted in his diary after the dinner.

The myth of Monty was created

Back in England, Churchill was excited by the news of Rommel's withdrawal:

"This is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning", said the Prime Minister in London.

While the British celebrated, Montgomery exploited his momentum on the battlefield to launch a fast-paced hunt of German troops along the Libyan coast. But the battlefield was not the only place where Montgomery utilised his good fortune. Although his sudden popularity at home was foreign to Montgomery, the general decided to use the situation for personal gain. In between skirmishes on the battlefield, he held numerous strategy meetings with his aides. The officers were impressed with the general and helped him to grow his reputation so that he could achieve the same hero status among the soldiers as "Desert Fox" Rommel.

As part of the plan, the adjutants would replace Montgomery's uniform with more distinctive clothing. First, the general donned a beret adorned with two large emblems that do not usually sit together: Montgomery's general's emblem and the badge of the Royal Tank Regiment. He's also pulled a thick sweater over his head, and with the jumper, the transformation was complete: Montgomery went from looking like an ordinary, dull English general to "a poorly dressed bohemian artist".

General Giovanni Messe's caravan was seized by Montgomery in Africa.

The general resisted cooperation

With his new reputation as a popular, successful and invulnerable general, Montgomery's confidence hit unimaginable heights in the Desert War's final month. But at the same time, Montgomery had to work with American generals – a relationship that proved troublesome.

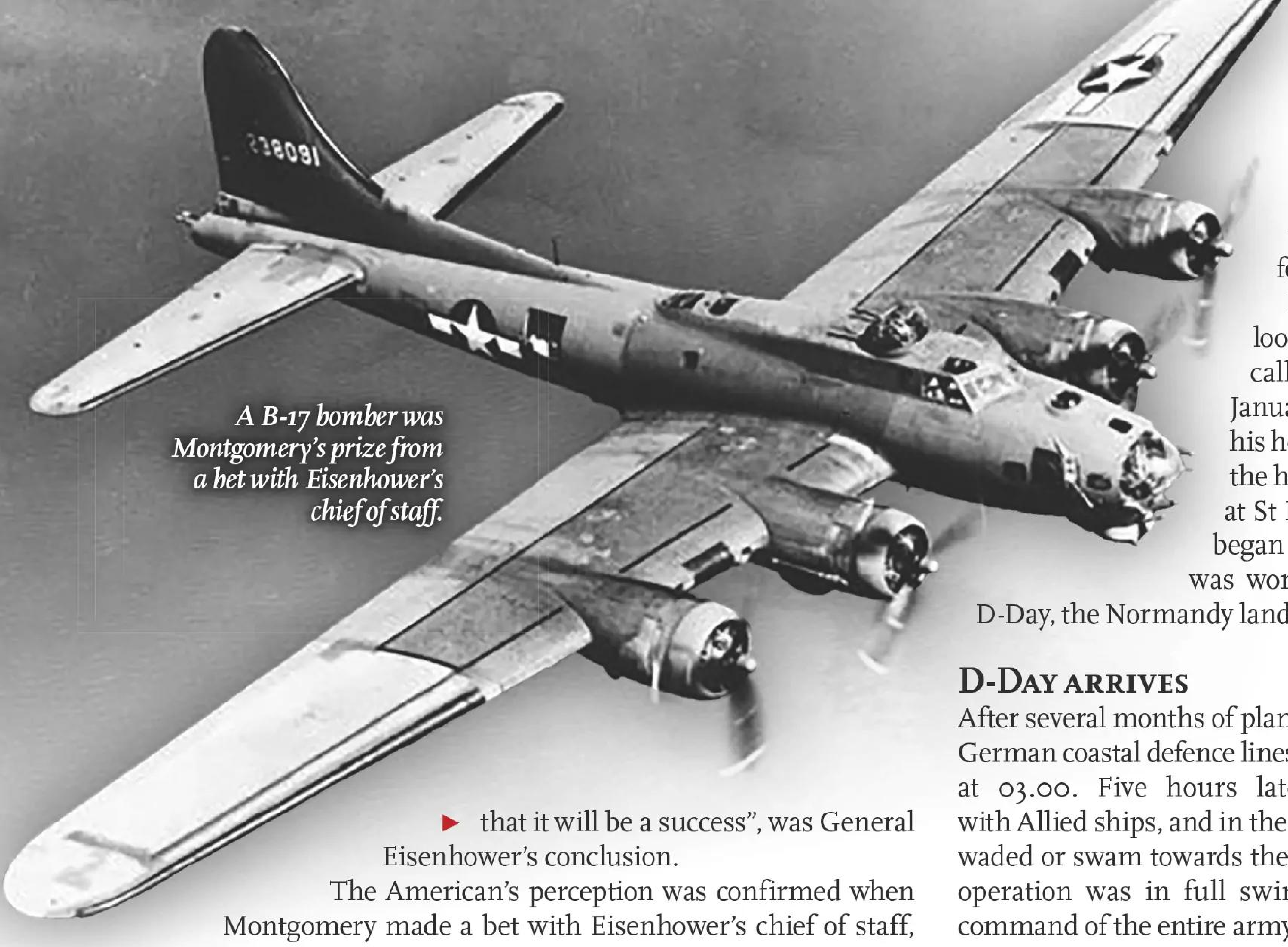
On 29th March, 1943, US General Dwight D Eisenhower entered Montgomery's headquarters in Tunis for the first time. The two generals had to establish a common strategy for the Allies on the way forward in North Africa and a later landing in southern Europe. But the meeting was a failure.

"He is certainly very good politically. But I can clearly say that he does not have the slightest clue on how to wage war. He should be kept well away from that kind of thing", Montgomery noted on Eisenhower in his diary after the meeting.

Eisenhower had similar thoughts on Montgomery:

"He is undoubtedly talented, but very pretentious. He is so proud of his successes to date, that he won't take a single step unless he is totally confident ►

British officers in the desert had binoculars, which could withstand the dust and sand of the Sahara.



A B-17 bomber was Montgomery's prize from a bet with Eisenhower's chief of staff.

► that it will be a success", was General Eisenhower's conclusion.

The American's perception was confirmed when Montgomery made a bet with Eisenhower's chief of staff, W B Smith: "What will you give me if my troops reach the coastal town of Sfax before April?" asked Montgomery.

Smith believed that Montgomery asked in fun, and therefore he promised Montgomery "anything" if he reaches the target.

On 10th April, 1943, Eisenhower's headquarters in Algiers received a telegram from Montgomery who wrote that he had reached Sfax and thus won the bet – and that he asked for an American B-17 bomber with full crew as a prize.

Eisenhower perceived Montgomery's claim as rudeness, but the American general could not break the promise to a popular British colleague. On 16th April, Montgomery therefore boarded the bomber, he called his flying fortress.

2,400 men
from a total of 9,000 fell back to their own lines when paratroopers were dropped into Arnhem. The rest were either killed or captured.

The bomber was not Montgomery's only gain from the war: months after German troops abandoned North Africa, Italian General Giovanni Messe was captured and Montgomery seized Messe's luxurious caravan that had followed him throughout the war.

Conflict grows with Americans

After the great success in North Africa, Montgomery along with the other Allied forces implemented a landing in Sicily and then penetrated deep into Italy's mainland.

The campaign involved heavy fighting, and the relationship between Montgomery and the American generals was not a happy one.

The parties fundamentally disagreed on their overall strategy, and engaged in a mutual rivalry to be the first to bring their forces to a particular city.

British soldiers in the Desert War were marked with a red "desert rat" on their uniforms.

Montgomery was saved from a looming confrontation when he was called home to England. On 2nd January, 1944, Montgomery landed in his hometown of London, where from the headquarters of the private school at St Paul's in the heart of the city, he began devising a plan that he believed was worthy of him: the preparation of D-Day, the Normandy landings.

D-Day arrives

After several months of planning, the first bombs fell on the German coastal defence lines in Normandy on 6th June, 1944 at 03.00. Five hours later, the horizon was covered with Allied ships, and in the hours following, 150,000 troops waded or swam towards the coast: history's greatest landing operation was in full swing – and Montgomery was in command of the entire army.

In the Desert War, Erwin Rommel was his opponent, and just like last German field marshal this one was absent when the Allies struck – this time he was on his way to his wife's 50th birthday.

The following day, Montgomery moved ahead slowly but surely – while old enmities flared up again. Eisenhower was Supreme Allied Commander in Europe, and together with other US generals believed that Montgomery was moving too slowly. The Americans believed that the idea was supported by the discovery that Montgomery kept pets at headquarters instead of focusing exclusively on war strategy. Montgomery wrote a letter to an acquaintance saying:

"I now have six canaries, one love bird and two dogs. One is a fox terrier that BBC journalists have given me and I've called him Hitler. The second is a golden cocker spaniel. I call him Rommel. Both Hitler and Rommel are beaten, when necessary. They are about to be deflected".

Every day the pressure on Montgomery by the American administration to move his troops faster grew. In September 1944, Montgomery developed a plan for the army to capture a series of bridges over the Rhine Delta in Holland – the so-called Operation Market Garden. The offensive would create the foundation for further advances against German industries in the Ruhr region in Germany.

Montgomery's plan, however, was highly risky: intelligence reports stated that two SS tank divisions were in the area. But Montgomery swept the warnings aside. He was confident in his abilities – and thought that the German army was falling apart. But this time the general made a grave error.

Montgomery takes a bridge too far

In the days following 17th September, 35,000 British, American, Canadian and Polish paratroopers were dropped into the area around the bridges in the Netherlands as part of the operation. A number of the drops were too far from the target and ran into the eager SS divisions. Of the 9,000 men who were dropped near Arnhem, only 2,400 made it back to the Allied lines. The rest were killed or captured.

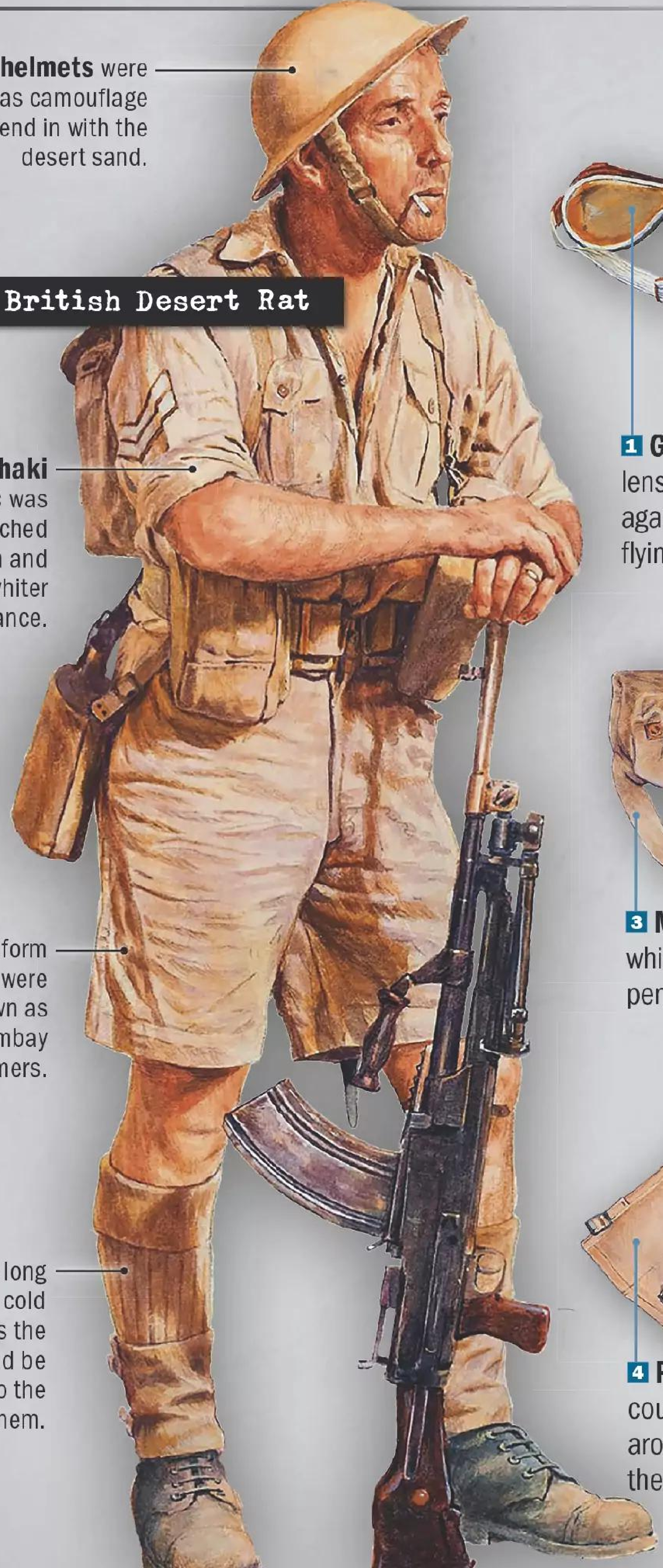
Montgomery admitted that German resistance was much tougher than he had expected. He deflected the main responsibility for the offensive fiasco on to the Americans – according to the general they betrayed his strength in Arnhem, and in the months following, Montgomery became more and more obsessed with the differences that existed between him and the American generals. In a letter to British War Secretary James Grigg in December 1944, he wrote:

"The American plan to win the war is horrible. It cannot succeed, and the war will continue".

Eisenhower, however, had had enough of the officious Briton, who seemed out of control of all Allied forces in Western Europe. At a meeting on 30th December in ▶

Desert Rats wore shorts

The soldiers' uniforms were ideal for conditions in the desert with three quarter length shorts that could be folded up or tucked in long socks.

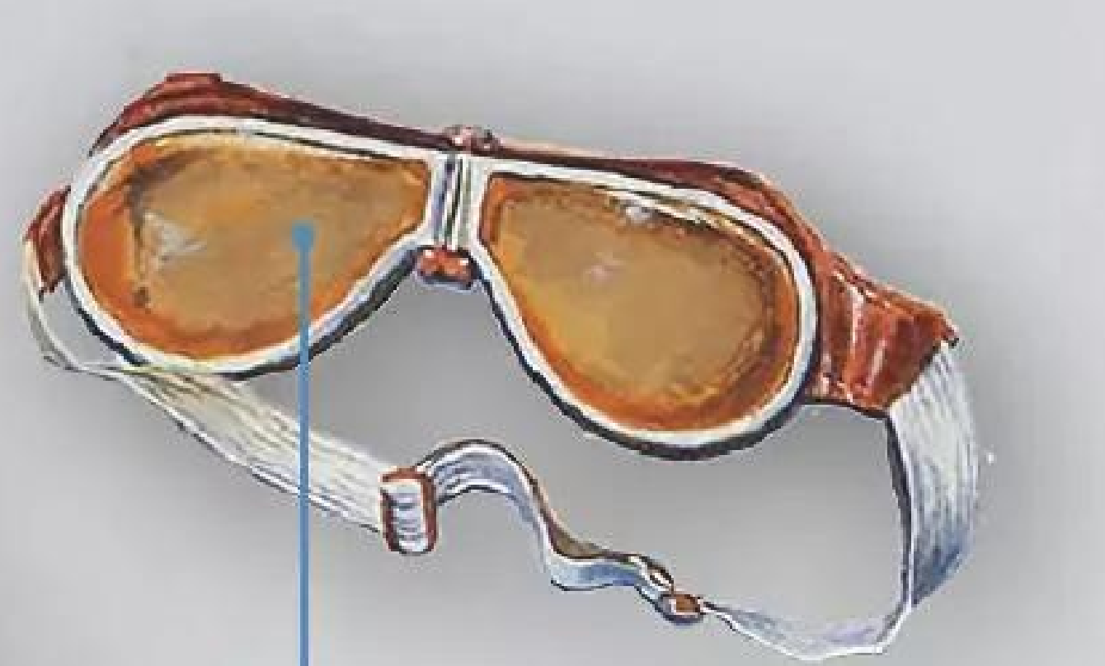


Khaki helmets were worn as camouflage to blend in with the desert sand.

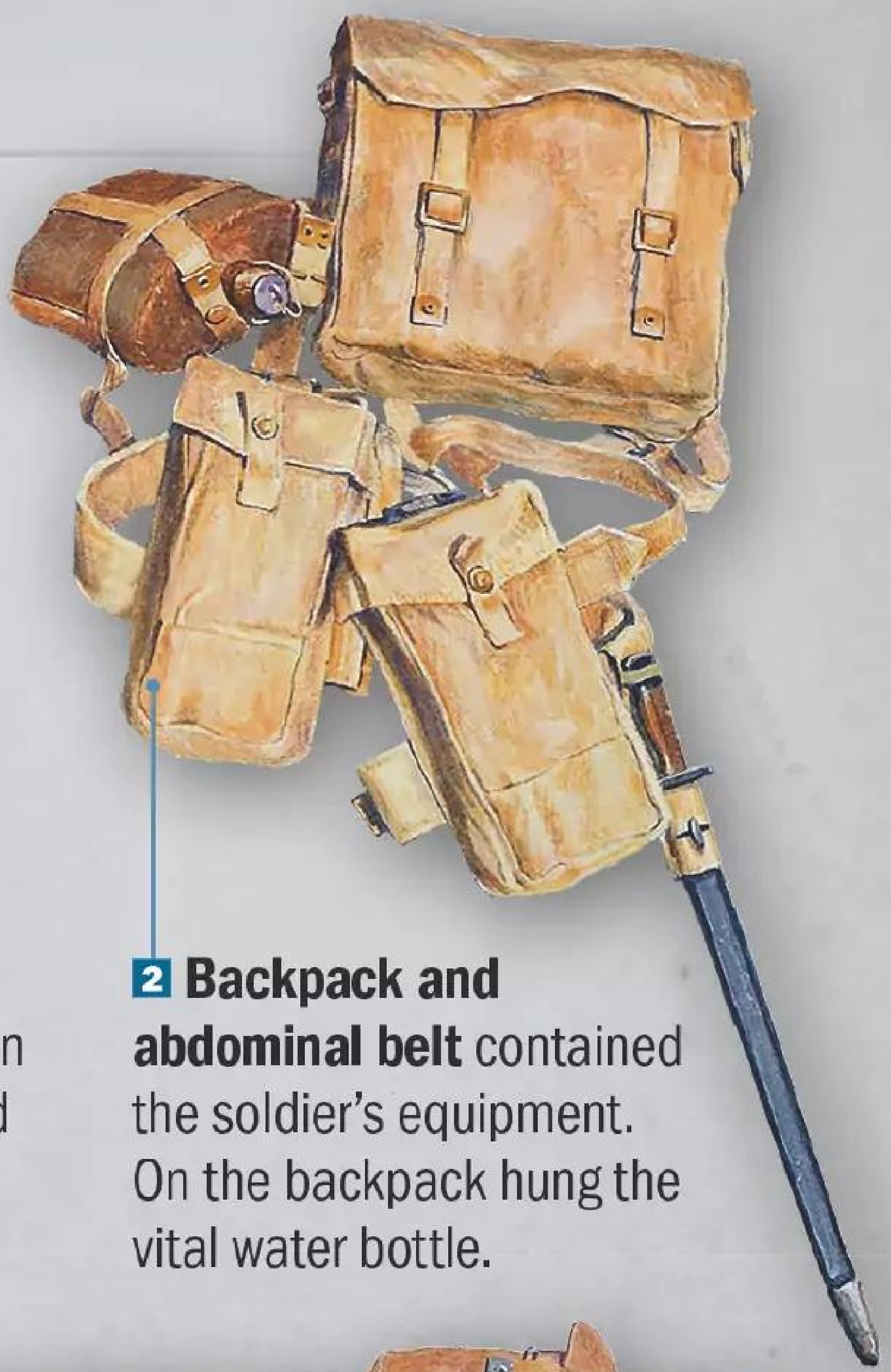
The khaki fabric was quickly bleached by the sun and became whiter in appearance.

Desert uniform **shorts** were known as Bombay Bloomers.

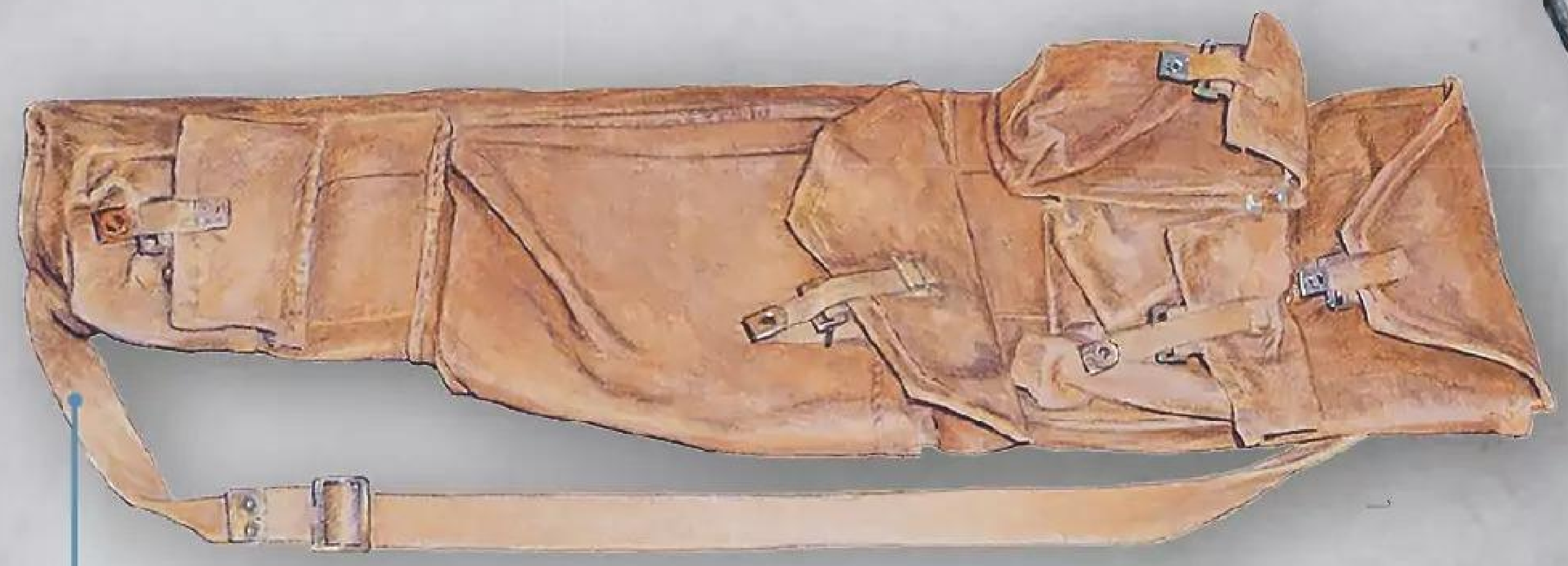
Socks were long and on cold evenings the shorts could be tucked into the top of them.



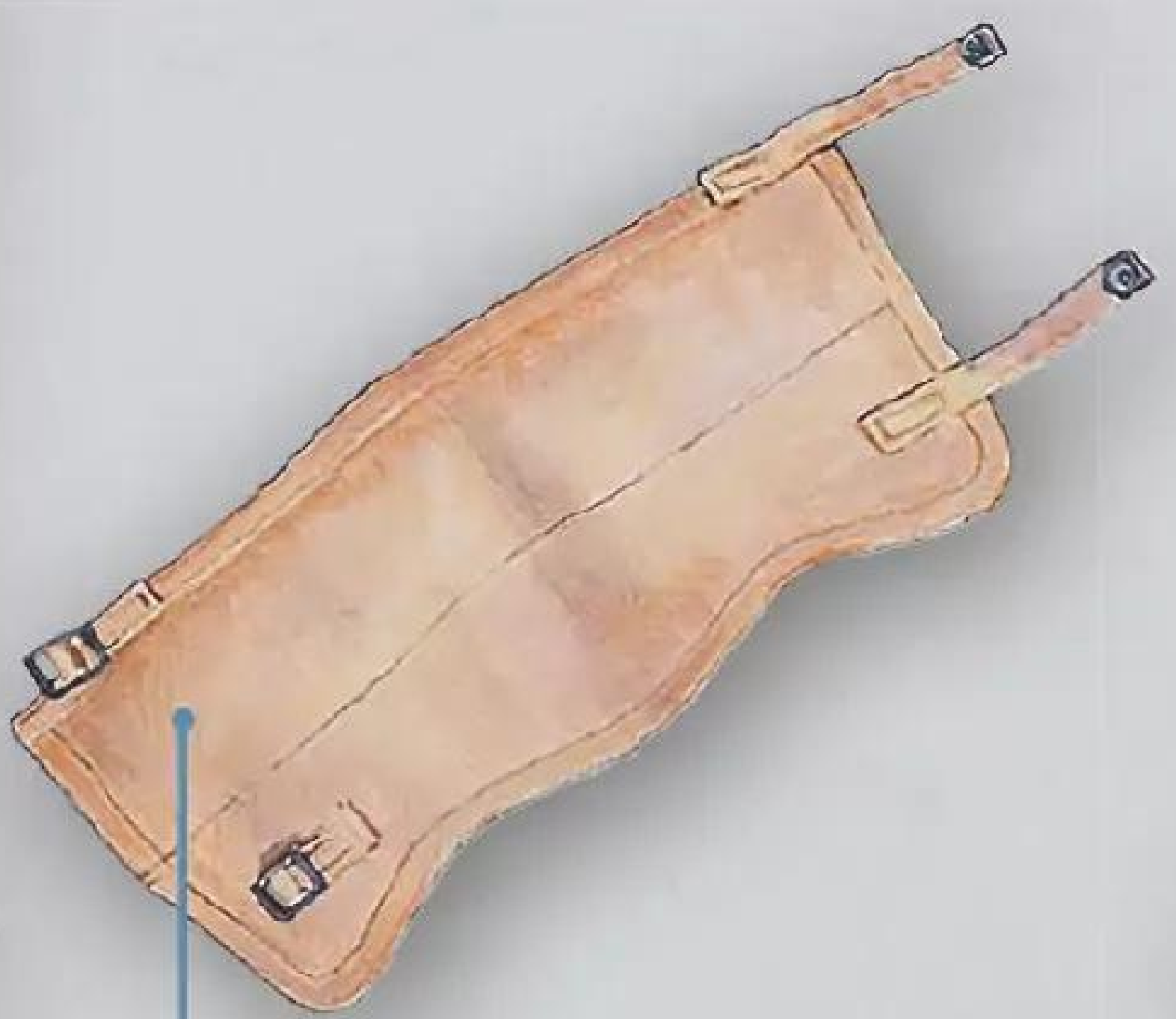
1 Goggles with yellow lenses provided protection against the sun's rays and flying desert sand.



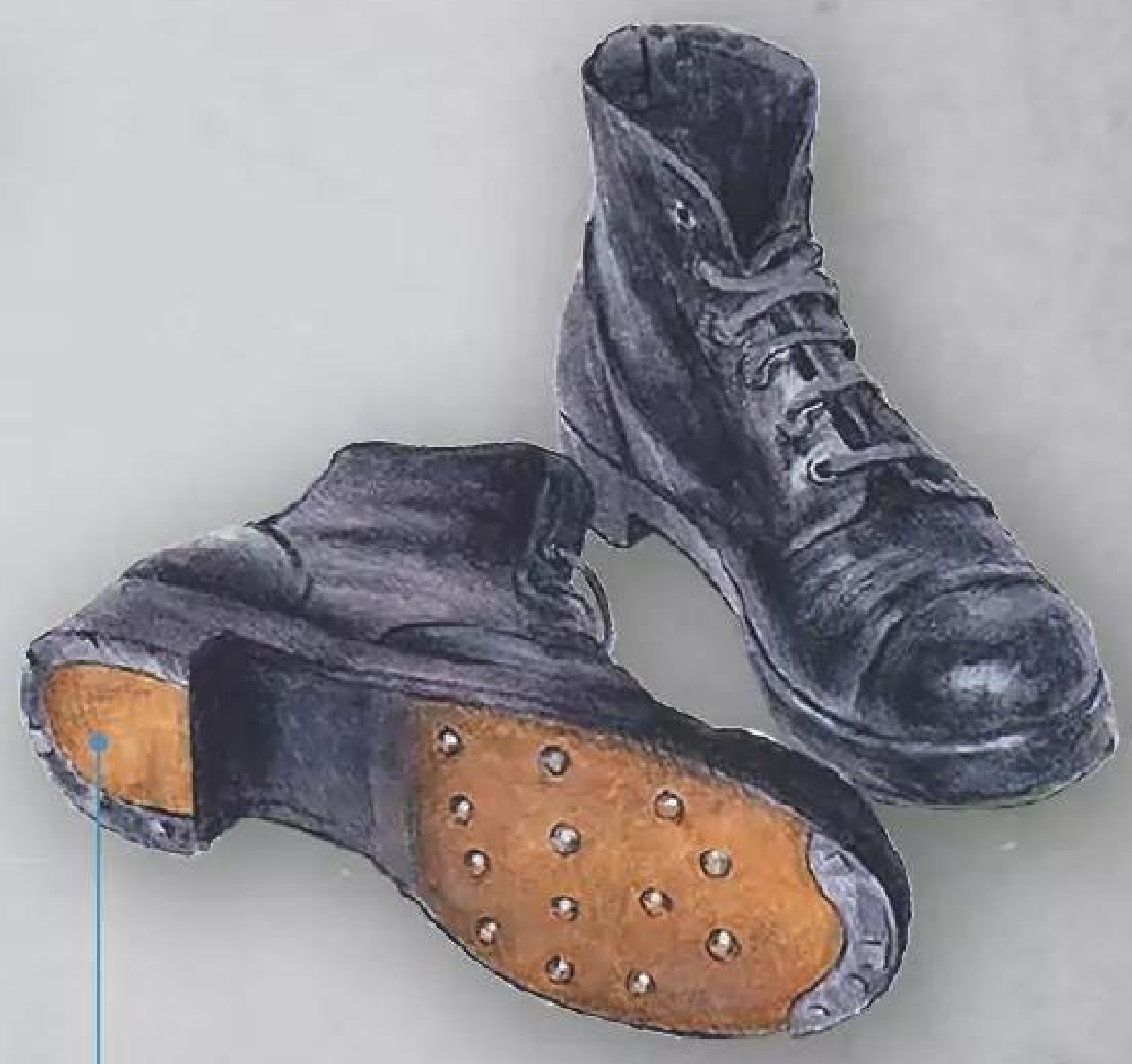
2 Backpack and abdominal belt contained the soldier's equipment. On the backpack hung the vital water bottle.



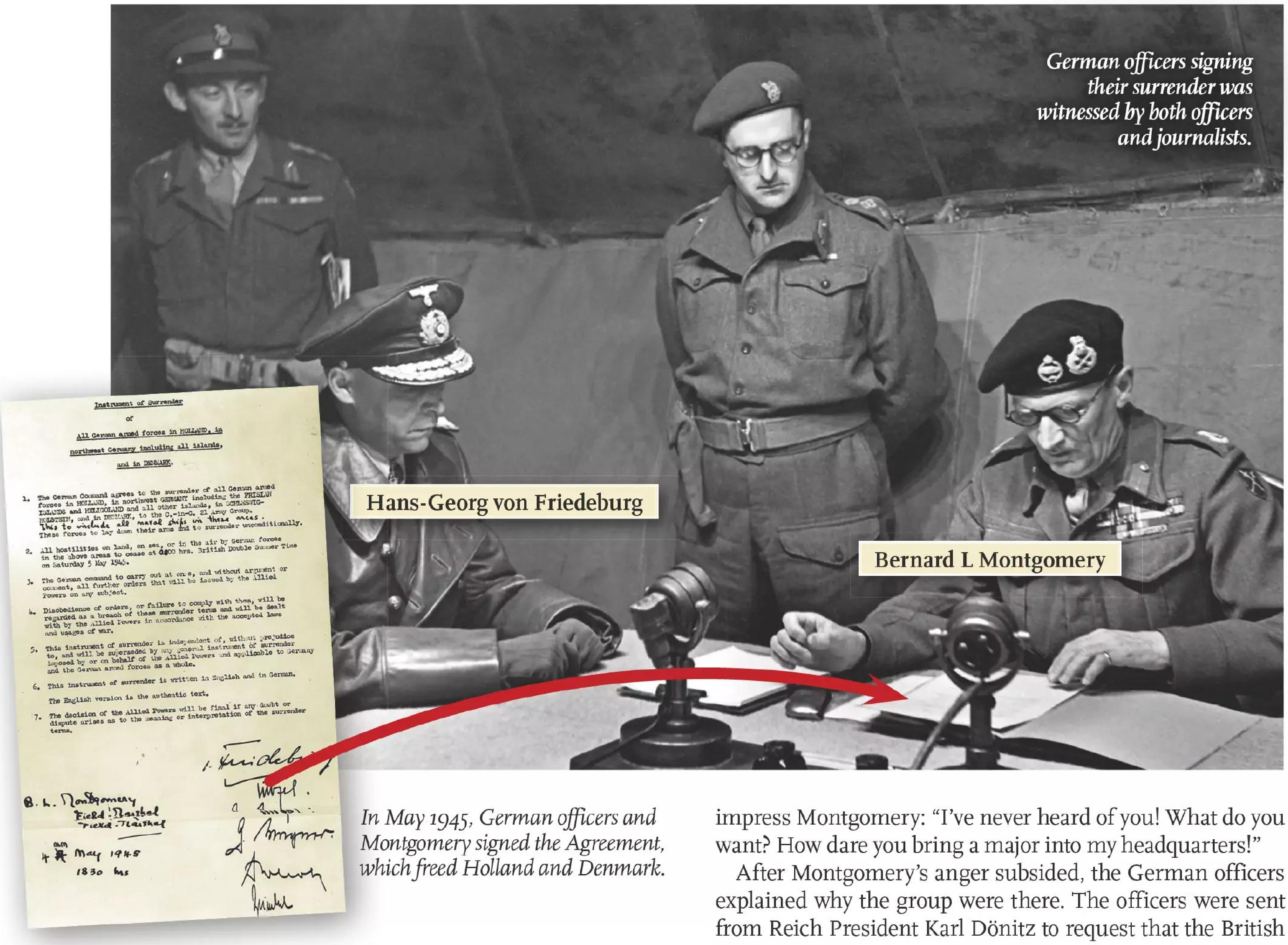
3 Machine gun called a Bren-gun was stored in a casing, which protected the weapon against sand that could penetrate and damage the gun's precision engineering.



4 Protective fabric could be wrapped around calves to protect the ankles.



5 Short black boots were standard footwear for British soldiers in the Desert War.



German officers signing their surrender was witnessed by both officers and journalists.

Instrument of Surrender

of

All German armed forces in HOLLAND, in

northwest Germany including all islands,

and in DENMARK.

1. The German Command agrees to the surrender of all German armed forces in HOLLAND, in northwest GERMANY including the FRISIAN ISLANDS and HELIGOLAND and all other islands, in SCHLESWIG-HOLSTEIN, and in DENMARK, to the C.-in-C. 21 Army Group. This to include all naval ships in these areas. These forces to lay down their arms and to surrender unconditionally.
2. All hostilities on land, on sea, or in the air by German forces in the above areas to cease at 0800 hrs. British Double Summer Time on Saturday 5 May 1945.
3. The German command to carry out at once, and without argument or comment, all further orders that will be issued by the Allied Powers on any subject.
4. Disobedience of orders, or failure to comply with them, will be regarded as a breach of these surrender terms and will be dealt with by the Allied Powers in accordance with the accepted laws and usages of war.
5. This instrument of surrender is independent of, without prejudice to, and will be superseded by any general instrument of surrender imposed by or on behalf of the Allied Powers and applicable to Germany and the German armed forces as a whole.
6. This instrument of surrender is written in English and in German.

   The English version is the authentic text.
7. The decision of the Allied Powers will be final if any doubt or dispute arises as to the meaning or interpretation of the surrender terms.

v. Friedeburg

Kinzel

B. L. Montgomery
Field-Marshal

4 May 1945
1830 hrs

In May 1945, German officers and Montgomery signed the Agreement, which freed Holland and Denmark.

Versailles, Eisenhower was ready to topple Montgomery who recognised defeat in the power struggle and sent a letter to Eisenhower, where he promised to stand 100 per cent behind the US commander in the future.

GERMANS SURRENDER

In the spring of 1945, Nazi Germany was undoubtedly about to fall – but politicians in western countries had to face the fact that the Western alliance was no longer just fighting against the Germans, but also had to monitor Stalin in the Baltic Sea. Therefore, Montgomery had to quickly to cross the Elbe and reach Lubeck to prevent the Red Army from marching up to Jutland in Denmark.

On 2nd May, the general arrived and effectively stopped the Red Army's progress. The day after, Montgomery heard the sound of a military vehicle outside the camp at Lüneburger Heide in northern Germany. Five German officers sat in the car – among them the chief of the German Navy, Admiral von Friedeburg – in full uniform with black boots. Montgomery step out of the caravan and approached slowly:

"Who are you?" shouted the general at the people in the car. The interpreter stated the name and rank of the Germans, where the lowest-ranking officer was Major. Their titles didn't impress Montgomery: "I've never heard of you! What do you want? How dare you bring a major into my headquarters!"

After Montgomery's anger subsided, the German officers explained why the group were there. The officers were sent from Reich President Karl Dönitz to request that the British accept the surrender of three German armies. Initially Montgomery rejected the Germans' offer, but after lunch the parties came to an agreement.

The rain poured down on 4th May, when a hastily convened team of journalists set up their equipment in Montgomery's headquarters. Shortly after, the General along with Admiral von Friedeburg, Rear Admiral Wagner, General Kinzel, Colonel Poleck and Major Freidel arrived. In silence the Germans signed a document that was then presented to Montgomery.

"I will sign on behalf of the Allied commander, General Eisenhower", stated the British General solemnly.

The German armies in Holland, Northwest Germany and Denmark – a total of more than a million soldiers – had surrendered to Montgomery. The event was the largest exchange during WWII.

The surrender was also a personal victory for the controversial general. In the war's final months, Montgomery was kept away from all important battles, but now he was suddenly back at the centre of things – loved and hailed as a war hero by the people in the liberated countries and still controversial among political leaders and military colleagues. The general retained both positions until his death in 1976.

150,000

Allied soldiers stormed onto the Normandy beaches on 6th June, 1944. Montgomery led the operation, the greatest amphibious landing in history.

Monty rejected his family

Bernard Montgomery's childhood in London was hard with corporal punishment both at school and at home. When he lost his beloved wife, Montgomery turned his back on his family and devoted his life to the military, where he became a brusque war strategist.

In 1944, when Montgomery went to work at St Paul's in London to plan the D-Day invasion, it brought back memories that he had tried to forget. During field operations he had had no contact with his mother or siblings and wrote little about his son. Upset by his family, Montgomery experienced a traumatic upbringing: his father was never home, and his mother beat the children. His return to England also triggered memories of grief at the loss of his wife, who'd died from septicaemia after an insect bite in 1937.

Robert Montgomery
Grandfather

Unknown
Grandmother

Frederic William Farrar
Grandfather

Lucy Mary Farrar
Grandmother

Henry Montgomery
Father: worked as a bishop and was almost never home with the family.

Maud Farrar
Mother: often beat the children in their father's absence.

Harold Montgomery
Brother

Donald Montgomery
Brother

Winsome Montgomery
Brother

Elizabeth Montgomery
Wife also called Betty, died after 10 years of marriage.

Bernard Montgomery
General Montgomery had a large family, but after his wife's death he turned his back on them.

David Montgomery
Son

Desmond Montgomery
Brother

Colin Montgomery
Brother

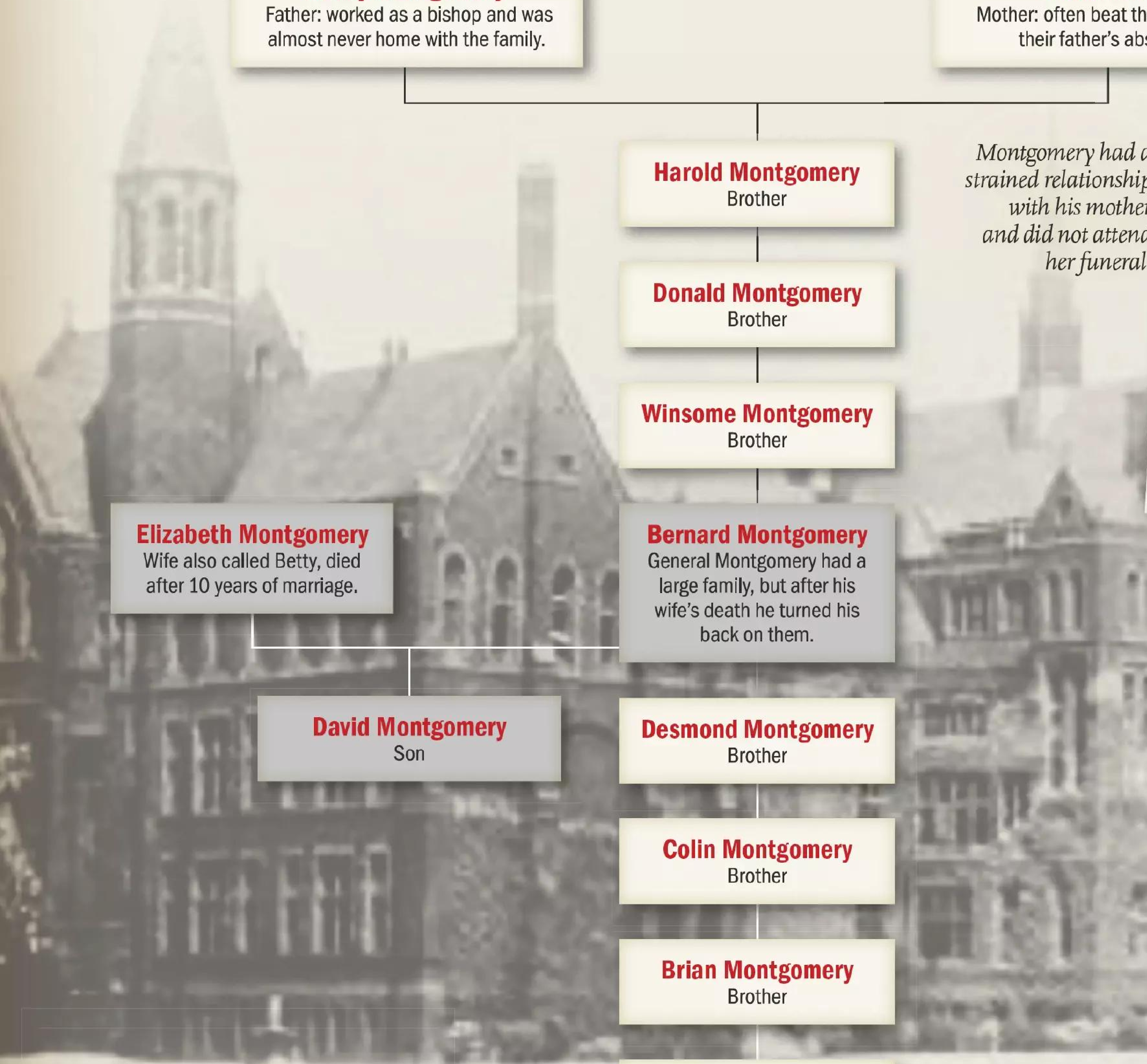
Brian Montgomery
Brother

Sybil Montgomery
Sister

Una Montgomery
Sister

Maud Farrar

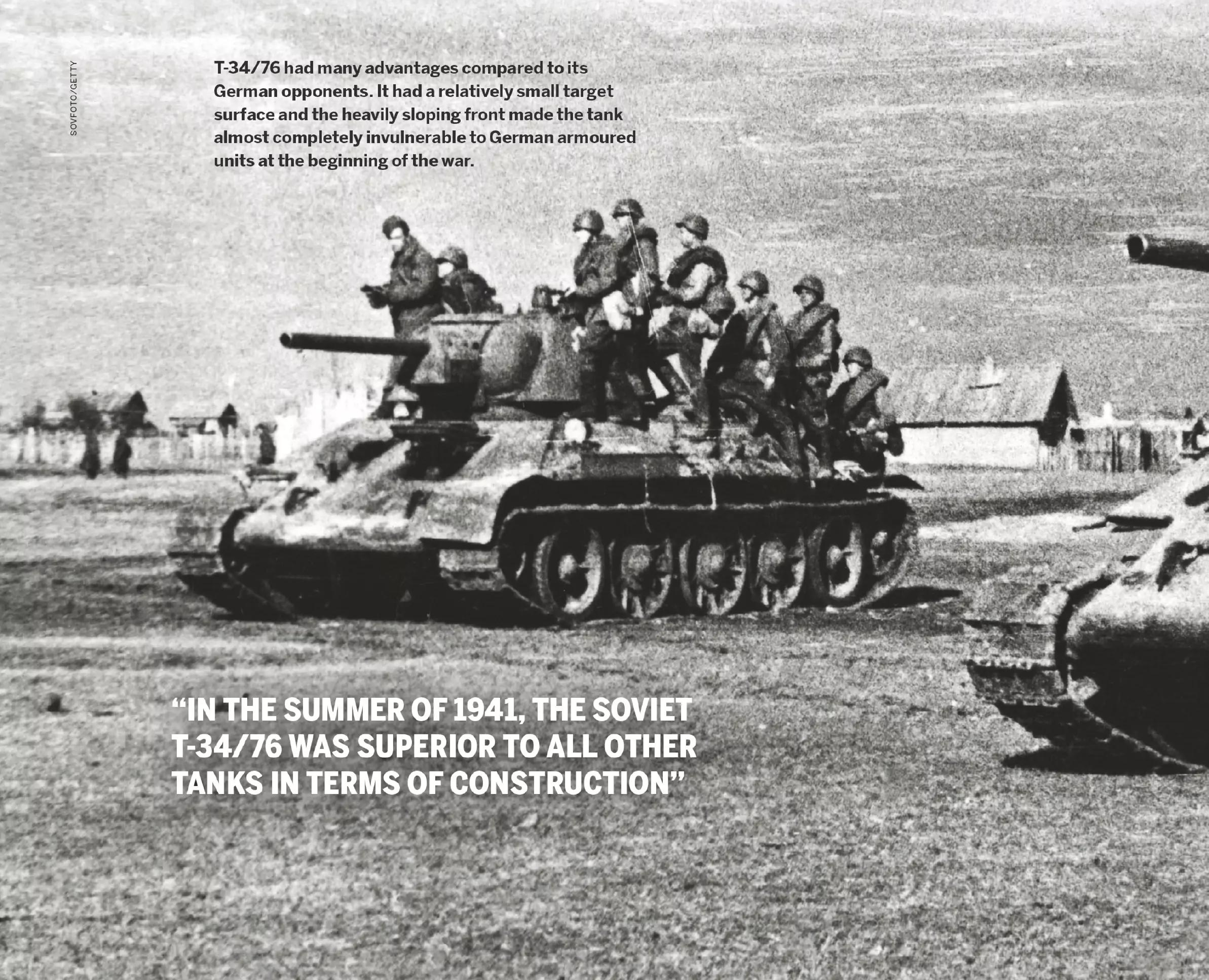
Montgomery had a strained relationship with his mother and did not attend her funeral.



Montgomery went to school at St Paul's for four years – he later remembered frequent beatings and brawls.

THE SOVIETS’

The Soviet T-34/76 was arguably a better tank than its German competitors and it enjoyed a clear numerical advantage – nevertheless, it was Germany who stormed ahead on the Eastern Front in the summer of 1941. The Red Army failed to exploit the **T-34/76’s advantages** due to poor planning, incomplete training and lack of supplies.



SOVFOTO/GETTY

T-34/76 had many advantages compared to its German opponents. It had a relatively small target surface and the heavily sloping front made the tank almost completely invulnerable to German armoured units at the beginning of the war.

> “IN THE SUMMER OF 1941, THE SOVIET T-34/76 WAS SUPERIOR TO ALL OTHER TANKS IN TERMS OF CONSTRUCTION”

Text: **HARALD SONESSONN**

BEST TANK

When the Germans launched Operation Barbarossa in the summer of 1941, the Soviet T-34/76 was superior to all other tanks in terms of construction. The 76-mm gun – especially the new and longer F-34 version – could strike its enemies from extremely long range, a distance that its counterparts couldn't match; the Germans had to rely on assault guns or 88-mm anti-aircraft guns in order to incapacitate the T-34 before it could get within firing range of their forces.

The T-34/76 was a relatively small tank with a correspondingly small target surface, especially when it was in a firing position with the turret barely exposed.

The heavily sloping hull made the T34/76 almost completely invulnerable to attack from German armoured units. The slope improved its protective capability considerably because the projectiles ▶

Most common tanks

During World War II, no other tank was produced in such great numbers as the T-34/76. This is its production history.

1940

17th March: demonstration of T-34/76 for Stalin.
31st March: decision made to start production of T-34/76.
June: the first four prototype tanks are approved.
15th September: T-34/76 model 40 enters production.
19th October: cast of the turret approved for production.

1941

March: production starts on T-34/76 Model 41 with the new, longer F-34 gun (76-mm).
22nd June: Germany attacks USSR. T-34 sees combat in Lithuania.
Autumn: several small adjustments, including a new turret hatch with periscope, are added to the T-34/76 model 42.

ULLSTEIN/IBL

A destroyed T-34/76 m.40 in June 1941.

tended to slip off the tank without penetrating the hull.

Despite having a bigger stock of superior tanks, the Soviets were in poor shape when the German invasion began on 22nd June, 1941. There were several reasons for this. First, the Red Army was not prepared for war. Stalin's purges of the 1930s – especially those in 1936-37, which resulted in many of the Red Army's most skilled senior officers being discharged, imprisoned or executed – meant that the Soviet military had lost vital experience from its upper echelons and had therefore failed to adapt to the demands of modern warfare.

One military commander to whom Stalin did listen was General Dmitry Pavlov, Head of the Directorate of Tank and Armoured Car Troops. His experience in the Spanish Civil War contributed to his erroneous decision to distribute tanks and larger mechanised forces throughout his infantry forces. (On the plus side, it also led to the development of the T-34.)

Following the spectacular progress of the *Wehrmacht* during its campaign in France in 1940, the Soviets belatedly decided to establish some new tank and mechanised corps.

The reorganisation was still underway, though, in the summer of 1941 when the Germans crossed the frontier. Officers, soldiers, vehicles and equipment were all missing. The commanders who were assigned to the new units didn't really understand how the forces should work and be managed. Spare parts, fuel and ammunition were in short supply and

Soviet soldiers march past a group of T-34s in 1942. The nearest tank is a command model with a radio antenna. "For the motherland" is painted on the turret.

KEYSTONE/GETTY

SOVFOTO/UIG/GETTY

T-34/76 m.43

1942

22nd June: a new larger, hexagonal turret with twin hatches (the T-34/76 Model 43) is approved for production..

1943

June: tank commander dome with 360-degree observation hatch is introduced.
July-August: the Battle of Kursk - around 2,000 T-34s take part in "the world's greatest tank battle".
December: production begins on the T-34/85. Big changes: a larger turret with an 85-mm gun, thicker armour and a five-man crew.

1944

January: T-34/85 begins to be delivered to the forces.
Summer: the production of T-34/76 ceases. More than 34,000 tanks were rolled out of Soviet factories in four years.

The replacement tank, the T-34/85 m.43.

what there was could not always be used since the new units also lacked vehicles.

Tank Sergeant Major Semen Matveev was one of those affected. "My corps was less than half its regulation strength. We had only bits and pieces. My tank battalion was in fact less than a company," he later complained.

Moreover, the Soviets' communication and radio equipment were inadequate. Its electronics industry was far behind that of the western world and the Red Army's commanders failed to understand how such technological developments revolutionised the way a modern army was led. Normally, only Soviet command tanks had radio, but it was technically poor: cumbersome and with too-short a range. This severely hampered their ability to coordinate movement and combat.

As troublesome as these issues were, though, it was the strategic and operational planning and its subsequent implementation that must bear the brunt of responsibility for the Soviets' catastrophic entry into the war.

WHEN OPERATION BARBAROSSA was launched, it seemed that two powerful forces were ranged against one another. The Germans had 3,700 tanks and anti-tank guns against 28,800 Soviet units. Most of the Soviet tanks were older, lightly armoured and insufficiently armed. However, there were also 975 of the new, medium-heavy T-34/76s and about 500 of the also-new, heavy KV-1s. The Soviets thus had about 1,475 new, modern vehicles that were comparable with the German's 1,146 Panzer III and Panzer IV tanks.

Despite the odds, the Germans advanced rapidly between the 22nd June and the 9th July, leaving a trail of more than 11,000 crippled Soviet tanks in their wake, including most of the new T-34s. Lost in newly claimed German territory, there was no chance of retrieving and repairing the tanks. Worse, many of the crews had been captured or killed.

There were a couple of reasons why the T-34 didn't perform as well as it should have done. First, there was the matter of training: most of the crews only had superficial knowledge of the tanks, and well-coordinated companies were virtually non-existent. Few drivers had driven more than a few hours in training, which led to them damaging the tank when they tried to use it for the first time. The officers also lacked training in how to command tanks, and even fewer understood how to take advantage of the tank's strengths. The second reason for its initial, poor performance was a lack of testing. The T-34 had several teething problems: the gearbox was very heavy to work, and on long journeys many of the tanks developed operating problems that led to engine failures.

"MOST OF THE CREWS ONLY HAD SUPERFICIAL KNOWLEDGE OF THE TANKS, AND WELL-COORDINATED COMPANIES WERE VIRTUALLY NON-EXISTENT"

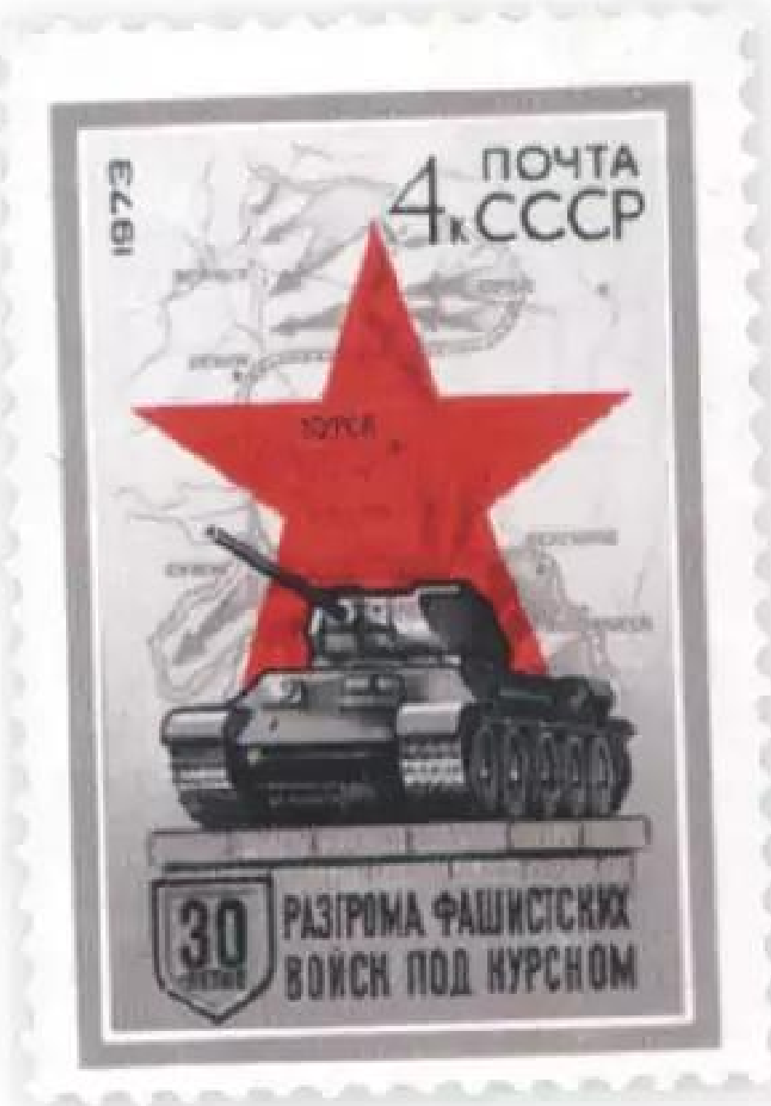
The Soviets were quick to learn from these initial losses, though. They reorganised their remaining personnel and tanks into brigade-sized units, each with around one hundred tanks, drawing additional resources from training camps and factories as required. They decided to prioritise production of the existing model, rather than fixing its shortcomings. The thinking apparently being that if there were enough tanks, it wouldn't matter if some were lost. Stalin is said to have once remarked that "quantity has a quality all its own ".

TANK FACTORIES that were threatened by advancing Germans were moved further east. This led to a temporary decline in production, but it proved to be the correct decision in the long term.

The Soviet efforts yielded results, and the T-34 started to become a tank worthy of respect. In October 1941, a report from Langermann-Erlancamp's 4th Panzer Division claimed that: "Time and again our tanks have been split right ►

open by hits from the front and the commander's cupolas on the Mark III and IV tanks have been completely blown off... proof of the great accuracy and penetration of the Russian (T-34) 7.62-cm tank cannon."

A soldier in the same division was altogether more succinct in his summary: "T-34s knocked off our tanks like rabbits."


1973
ПОЧТА
4 к СССР
30
РАЗГРОМА ФАШИСТСКИХ ВОЙСК ПОД КУРСКОМ

A T-34 adorns a Soviet stamp from 1973, the 30th anniversary of the Soviet victory at the Battle of Kursk.

HOW GOOD WAS THE T34/76? To understand it, you need to think in terms of the power of the tank and its crew, plus the numbers of units in the field, in comparison with its opponent. The relative strengths of the two sides changed during the war – particularly in terms of the technical capabilities of individual tank models and the ability to mass-produce them. While Germany focused on quality, investing in the development of technically superior tanks, the USSR concentrated on quantity, establishing a plethora of armament factories along with the means of supplying them.

The T-34's layout that placed two of its four crew members in the turret had significant drawbacks compared to the German arrangement that housed three out of five of the crew there. It was simply not possible for a tank commander to focus on leading his crew while also acting as the gunner. This problem was further compounded for platoon leaders, who had to direct the other tanks in the squad while keeping track of signals from superior officers. In the absence of a radio, platoon leaders had one flag to communicate with their tanks and another for signalling their company commander.

The traverse gear that rotated the T-34's turret was better than the one used in German tanks. The T-34's turret could make a full turn in just 12 seconds, twice as fast as its German equivalent. However, this was only really an advantage in close-quarter engagements. The low turret meant that the gun couldn't be lowered very easily, which limited the T-34's ability to fire from behind a crest. The crew's ability to quickly and accurately identify targets was critical to the tank's survival and its ability to quickly engage with its enemies. The tank commander was responsible for keeping the entire field under observation, although other crew members would assist in this as their other duties permitted. By separating the role of tank commander and gunner, German crews could sometimes react more quickly as the gunner would constantly be looking for targets in the direction that the tank was travelling and could quickly shoot at any that appeared, even if his tank commander was looking in another direction. With the two roles being combined in the T-34/76 there wasn't this same constant level of forward observation.

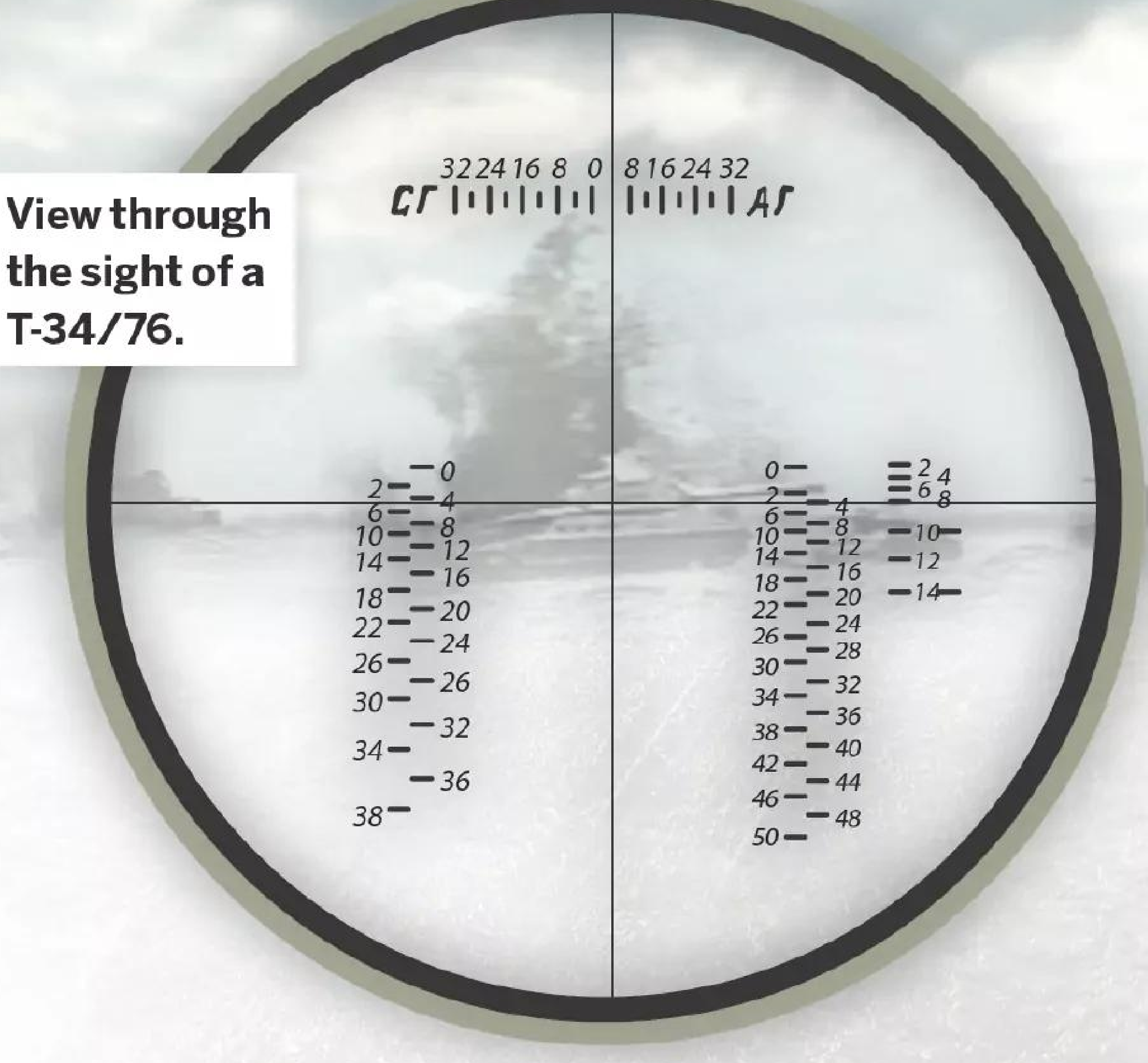
"THE T-34'S TURRET COULD MAKE A FULL TURN IN JUST 12 SECONDS, TWICE AS FAST AS ITS NEAREST GERMAN EQUIVALENT."

The T-34's prisms and periscopes were far inferior to those used by the Germans. Many tanks preferred to drive with their hatch ajar because they could barely see through the periscopes. Internal communication was performed with hand signals and by the tank commander kicking to the left or right of the driver to indicate which way he should turn. It was almost impossible to hear each other when the tank was moving and the tank's internal comms system was unreliable. The loader had very little space to work in, which slowed the loading of the gun.

The T-34's designers had chosen a diesel engine to reduce the risk of fire, but tests made during the war showed that petrol-fuelled tanks were not significantly more prone to fires than diesel-powered ones. In some cases, the T-34 even caught fire more easily than petrol tanks – possibly due to the location of the fuel tank on the vehicle. In fact, the most significant difference between petrol and diesel engines was their noise-levels: the T-34/76 engine was far louder than its petrol equivalents. This, in combination with powerful noise from uncoated metal wheels rubbing directly against the track assembly, meant that the tank could be heard from a great distance away.

COMPARED TO GERMAN TANKS, the T-34/76 was smoother to operate. It was heavier than the German tanks used in the first years of the war (26 tonnes compared to just over 20 tonnes), but since the engine was more powerful, it had a better horsepower-per-tonne ratio. Its actual speed in the field depended on several factors, while its theoretical speed is of little use in understanding its real capabilities. The T-34/76's ground pressure – the pressure exerted on the ground by the tracks – was clearly lower than its opponents'. This meant that the tank didn't sink as much on soft surfaces like clay, and could keep up its speed to avoid being bogged down. The range of the T-34 was also superior to its opponents'. In almost all cases, the tank could travel twice the distance of its enemies before refuelling.

Pre-production testing showed that the tank was reliable, but problems were introduced once the machine started to be fabricated in large numbers. In the first few years of the war, Soviet industry lacked both skilled labour and raw materials such as nickel and rubber. As a result, the quality



View through the sight of a T-34/76.

The T-34's optics were poor. According to one driver, the periscopes were made of "ugly yellow or green organic glass, giving a completely distorted, wavy picture ". Often the tank commander had to guide the driver through the terrain.

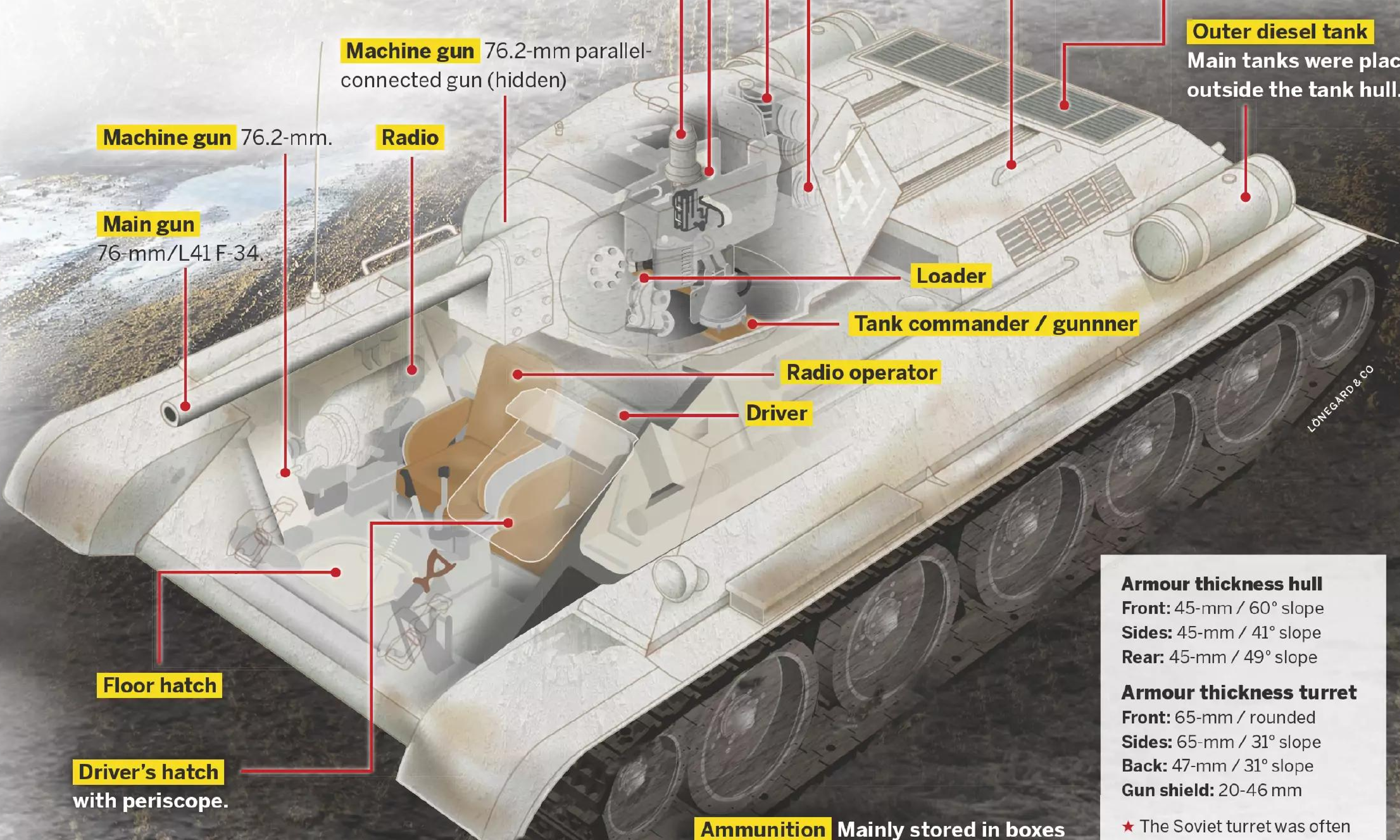
The tank commander had a periscope at the front of the turret and to the right of the gun.

Strengths on the Eastern Front 1941-1945

The table shows tanks and various tracked assault guns, including those under repair.

	Soviet	German
June '41	28,800	3,671
Mar. '42	4,690	1,503
May '42	6,190	3,981
Nov. '42	4,940	3,133
Mar. '43	7,200	2,374
Aug. '43	6,200	2,555
June '44	11,600	4,470
Sep. '44	11,200	4,186
Oct. '44	11,900	4,917
Nov. '44	14,000	5,202
Dec. '44	15,000	4,785
Jan. '45	14,200	4,881

T-34/76
1942 model



Turret

Sight

Periscope

Ammunition - machine gun.

Railings For accompanying foot soldiers.

Engine 12-cylinder V-2 diesel of 500 hp. Gearbox with four forward gears and one reverse.

Outer diesel tank Main tanks were placed outside the tank hull.

Machine gun 76.2-mm parallel-connected gun (hidden)

Machine gun 76.2-mm.

Radio

Main gun 76-mm/L41 F-34.

Loader

Tank commander / gunnner

Radio operator

Driver

Floor hatch

Driver's hatch with periscope.

Armour thickness hull
Front: 45-mm / 60° slope
Sides: 45-mm / 41° slope
Rear: 45-mm / 49° slope

Armour thickness turret
Front: 65-mm / rounded
Sides: 65-mm / 31° slope
Back: 47-mm / 31° slope
Gun shield: 20-46 mm

★ The Soviet turret was often poor quality; when a shell hit the tank, the turret was torn off and shrapnel flew around inside the hull..

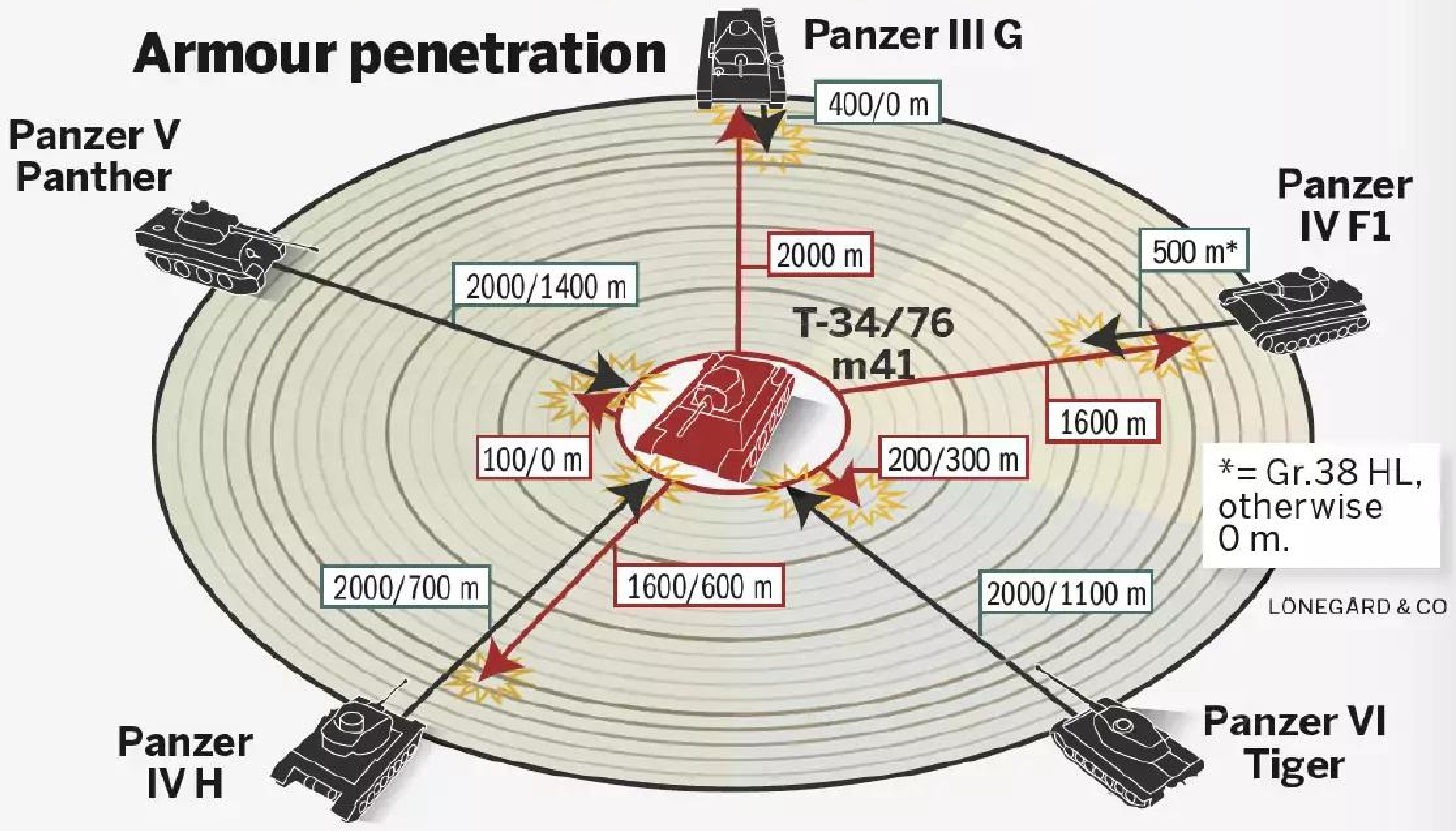
Ammunition Mainly stored in boxes on the floor where the loader stood and worked. On the inside of the hull there were holders for readily available rounds that the loader needed.

On the battlefield

T34/76 compared to enemy tanks

Tanks *The main types of tanks fighting on the Eastern Front*	**Armed forces** *The L-value gives the length of the barrel cf. to the calibre.*	**Armour (mm) in front turret / hull** **sloping armour, provides better protection.*	**Weight in tonnes**	**Horsepower per tonne**	**Ground pressure kg / cm**	**Range km road / terrain**
T-34/76 40 and 43	**76.2-mm L/30 el L/41**	**52/45* resp 70/47***	**26.3**	**19.0**	**0.64**	**455/260**
Pz III G	50-mm KwK L/42	30/30	20.3	13.6	0.92	165/95
Pz IV F1	75-mm KwK L/24	50/50	22.3	11.9	0.88	210/130
Pz IV H	75-mm KwK L/48	50/80	25.0	10.6	0.89	235/120
Pz V Panther D	75-mm KwK L/70	100/80*	43.0	16.3	0.70	200/100
Pz VI Tiger E	88-mm KwK L/56	100–110/100	57.0	12.3	0.74	195/110

Armour penetration



★ The diagram shows the ranges at which the T-34/76 and various German tanks could fight. The values are calculated from a perpendicular (seen from above) hit to the front panel. Where the armour thickness varies, two values (turret / chassis) are specified. In fact, in battle, distances were often shorter. They were influenced by weapon performance, optics, armour quality and ammunition type. German Gr. 38 HL had low output speed and could not be fired more than 500 metres.

Production of combat vehicles

USSR	**1941**	**1942**	**1943**	**1944**	**1945**	**Total**
T-34/76	**3,014**	**12,553**	**15,529**	**2,995**		**34,091**
T-34/85			283	11,778	7,230	19,291
Other tanks*	3,260	12,086	4,327	2,252	1,700	23,625
Assault guns**		51	4,047	11,958	6,267	22,323
Totalt	**6,274**	**24,690**	**24,006**	**28,983**	**15,197**	**99,330**

Germany	**1941**	**1942**	**1943**	**1944**	**1945**	**Total**
Panzer III (50 & 75mm)	1,713	2,608	235			4,556
Panzer IV (75-mm)	467	994	3,013	3,126	385	7,985
Panzer V Panther			1,768	3,749	459	5,976
Panzer VI Tiger E		84	647	623		1,354
Other tanks*	1,219	700	30	485	112	2,546
Assault guns**	762	2,011	5,064	8,909	2754	19,500
Total	**4,161**	**6,397**	**10,757**	**16,892**	**3,710**	**41,917**

* Including both light and heavy tanks. In the Soviet terms, one third were heavy, especially KV-1 and JS-2. The T-60 and T-70 are among the light tanks, the latter being the basis of the SU-76.
** For the Soviets, especially the SU-76. In German production there were about half different variants of StuG.

▶ of the T-34s delivered to the front line was very uneven. According to Platoon Commander Nikolai Zheleznov, "Each tank, each tank gun, each engine had its unique peculiarities ". The crew had to try to determine the characteristics of their individual T-34 as best they could before going into battle.

Due to the dramatic loss of personnel during the first half of the war, there was an urgent need to train new crews. There were several tank schools that provided basic training for soldiers and officers. Initially, training lasted at least three months for commanders and one month for loaders, machine gunners and radio operators. Soldiers were taught the bare minimum to perform their duty; there was no time for training in other areas.

Soldiers were assigned to training regiments for the next stage in their education. These regiments were stationed by the factories that produced the tanks. The idea was to train the crews to work together on their assigned tank before being sent to the front. In practice, only simple, limited troop and company exercises were carried out. When there were enough tanks to fill a freight train, they took the tanks out of the factory, drove them to an artillery range, fired three shots with the main gun and a magazine of machine gun cartridges, then the tank and crew were deemed ready for deployment.

They told us: here is your tank... Before they'd even finished assembling it, the train was ready to leave for the front. We filled out the forms, received a watch, a pen and a silk handkerchief for fuel filtration, and off we went to the front.

Captain GN Krivov, Tank Commander

If there was any fighting strength left in a company, the crews were told to attack. There were serious consequences for those who failed to comply. Any tanks left after the company could no longer fight were transferred to another company, while crews without tanks were sent back to join a new company – or re-join the old unit if it was resurrected. Of the 403,000 Soviet soldiers assigned to tanks during the war, 310,000 were killed.

"Driver-mechanic Grigoriy Ivanovich Kruyokov was ten years older than me", Krivov recalled, thinking of the man to whom he was indebted. "He used to be a car driver before the war and had already been in combat near Leningrad. Been wounded. He understood the tank well. I guess we survived the first battles only due to him."

IN THE SPRING OF 1942, German forces began to use anti-tank and assault guns to hit the T-34, including the 75-mm Pak 40 and 76.2-mm Pak 36(r). The latter was a Soviet anti-tank gun that had been rebuilt and was now being used against its

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The Red Army suffered from a serious lack of armoured transport vehicles. Instead, the soldiers had to sit on the back of the T-34/76 and provide infantry support during the fighting.

> **“WITH THE T-34, THE SOVIETS CREATED THE WORLD’S FIRST MAIN BATTLE TANK (MBT)”**

original owners. The Panzer III got a long 50-mm gun, while the Panzer IV was equipped with a 75-mm gun during the summer of 1942. The German forces’ increased ability to combat the T-34 resulted in greater Soviet losses, both in tanks and human lives. Technically, the T-34 was on a par with the German’s improved tanks, but it was equally useful against infantry and other vehicles. It flew off the production lines: in 1942, the USSR produced almost 25,000 combat vehicles compared to Germany’s 6,000. Of these, half were T-34s.

THE FOLLOWING YEAR, IN 1943, the Soviets introduced a new version of the T-34/76 with a slightly larger turret, which gave the crew a little more space, and increased ammunition storage. During the autumn, a new observation hood was also introduced to facilitate surveillance from within the tank.

In 1943, the ratio of Panzer IVs with long 75-mm guns increased. There were also increasing numbers of new Panzer V Panther and Panzer VI Tiger. This encouraged the Soviets to speed up development of the T-34/85, their replacement for the T-34/76.

In late 1943, the Soviets began to arm the T-34/76 with tungsten shells, which improved its performance against the new generation of German tanks until the mightier T-34/85 became widely available in mid 1944 and production of the T-34/76 ceased.

The T-34/85 featured a larger three-man turret and, for the first time, the role of tank commander and gunner were split into two distinctive jobs.

The T-34/76 was a successful construction: it was capable of battling other tanks in its class, but it could also be used to good effect against infantry and assault guns. Up to this point, tanks had been developed to answer specific needs. The T-34 changed that: for two years from 1941, it was a tank that could replace all the previous tanks. To use modern terminology, with the T-34/76, the Soviets created the world’s first main battle tank (MBT).

In parallel with improvements to the T-34/76, development of new tanks and increased production capabilities, the Red Army learned from its opponents. The lack of ability or – in many cases – incompetence that hampered the Soviets at the outbreak of the war replaced by an increased ability to counter the enemy. The reverse in Soviet fortunes wasn’t due to superior tactics or technology. Indeed, in struggles between equal forces, they rarely won; but the Soviets didn’t permit the war to be a struggle between equals. They turned the tide on the Eastern Front by ensuring that they had a numerically superior force in terms of men and machines. The T-34 was a big part of this strategy and no other tank on the Eastern Front was produced and deployed in such large numbers.

Harald Sonesson is a reserve officer with a background in the tanks service.

Further reading:
Panther vs T-34: Ukraine 1943 (2007) by Robert Forczyk.
⋆ **T-34 – Mythical Weapon** (2007) by Robert Michulec and Miroslaw Zientarzewski
⋆ **T-34/76 – Medium Tank** (2013) av Steven Zaloga.

MAN AGAINST MACHINE

How the infantry took on tanks

A Red Army soldier prepares to throw a second Molotov cocktail at a Panzer III tank while his comrade prepares to lay down covering fire with a PPSh-41. Photo from an exercise in July 1942.

It was an almost hopeless task being an infantry soldier attempting to defeat enemy tanks before armour-piercing shells were developed. Their **unconventional solutions** were as numerous as they were deadly.

Text: Anders Fager

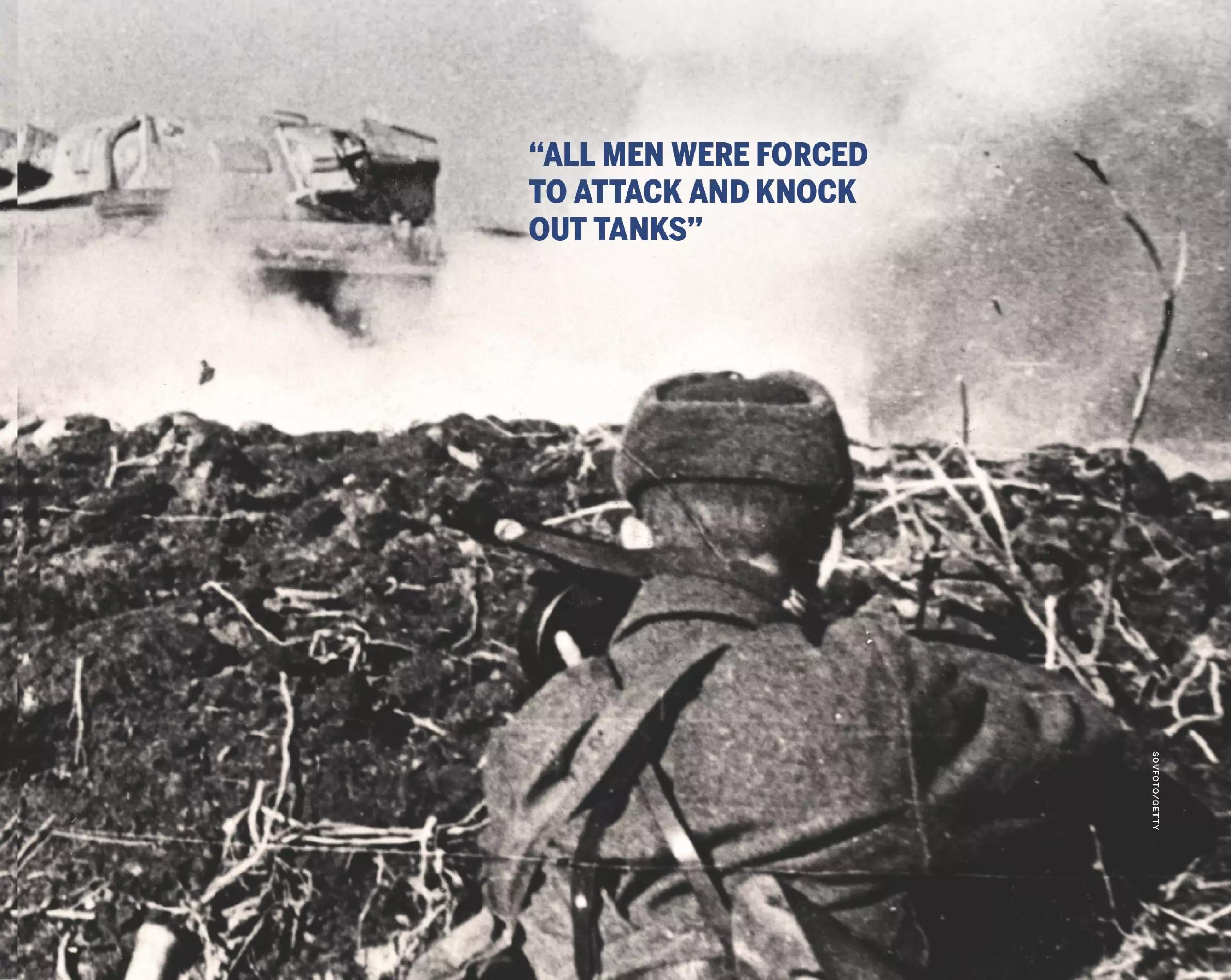
By the end of World War I, tanks became commonplace on the battlefield, and it was down to the infantry to try and stop them. They had no specialised weapons; instead, hand grenades were thrown, shots fired at the crew or attempts were made to break into them.

The last approach was easier than you might think, because the tanks were slow and almost exclusively rumbled around the trenches. They often drove in a fixed direction or had mechanical and engine problems, and then they could be treated like a bunker and besieged. Tanks that tried to roll over or between trenches often became victims of artillery that could still shoot them to pieces despite the fact armour-piercing shells didn't exist.

During the interwar period, both tanks and countermeasures were developed. Infantry were equipped with light anti-tank guns and portable anti-tank rifles, two weapon systems based around ripping through armour using a combination of hard projectiles and kinetic energy. In addition, mines and rifle grenades were developed, while the sharpshooters were equipped with armour-piercing ▶

ISTOCK/GETTY

A Molotov cocktail consists of a glass bottle of flammable liquid.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"ALL MEN WERE FORCED TO ATTACK AND KNOCK OUT TANKS"

ammunition. But the most important thing were anti-tank weapons, which like their own tanks, the infantry always expected to have in the vicinity.

During World War II, Finland and then Germany were forced to become leaders in the field of armoured protection for foot soldiers – simply because they were the first to meet superior enemy tanks with their own infantry.

When WWII broke out, German infantry had almost no access to anti-tank guns. The battalions had to trust the anti-tank rifle, but you rarely found more than one per platoon – if they existed at all.

Large-calibre rifles with armour-piercing ammunition had already been used against tanks during World War I. During the interwar period, all nations developed different so-called 'elephant guns' with leg support that offered good precision and range, but were heavy and unmanageable – for example, the Finnish Lahti L-39 weighed 49 kg, yet from the outset of war the rifle's impact was just below what was necessary. They could penetrate up to 20 millimetres (2 cm) of thick armour while a German Panzer III had around 30 mm of armour around its front and a French Somua S35 over 40 mm.

To achieve greater impact, a larger propellant and calibre were required, which led to a brutal recoil. The weapons now threatened to knock out the shooter. Anti-tank rifles were phased out to be replaced by anti-tank guns, which like the tank's own gun, fired at high velocity to break through armoured protection.

Although infantry were being forced into close combat with almost invulnerable tanks at this time, those higher up in command refused to draw any definite conclusions, preferring to let things take their natural course. During the Winter War, Soviet tanks jammed or panicked and retired if they got into skirmishes with opposing infantry.

The French monster tanks, such as the Char B1, were eventually knocked out by aircraft, howitzers or 88-mm anti-aircraft guns. They were slow and consumed too much fuel.

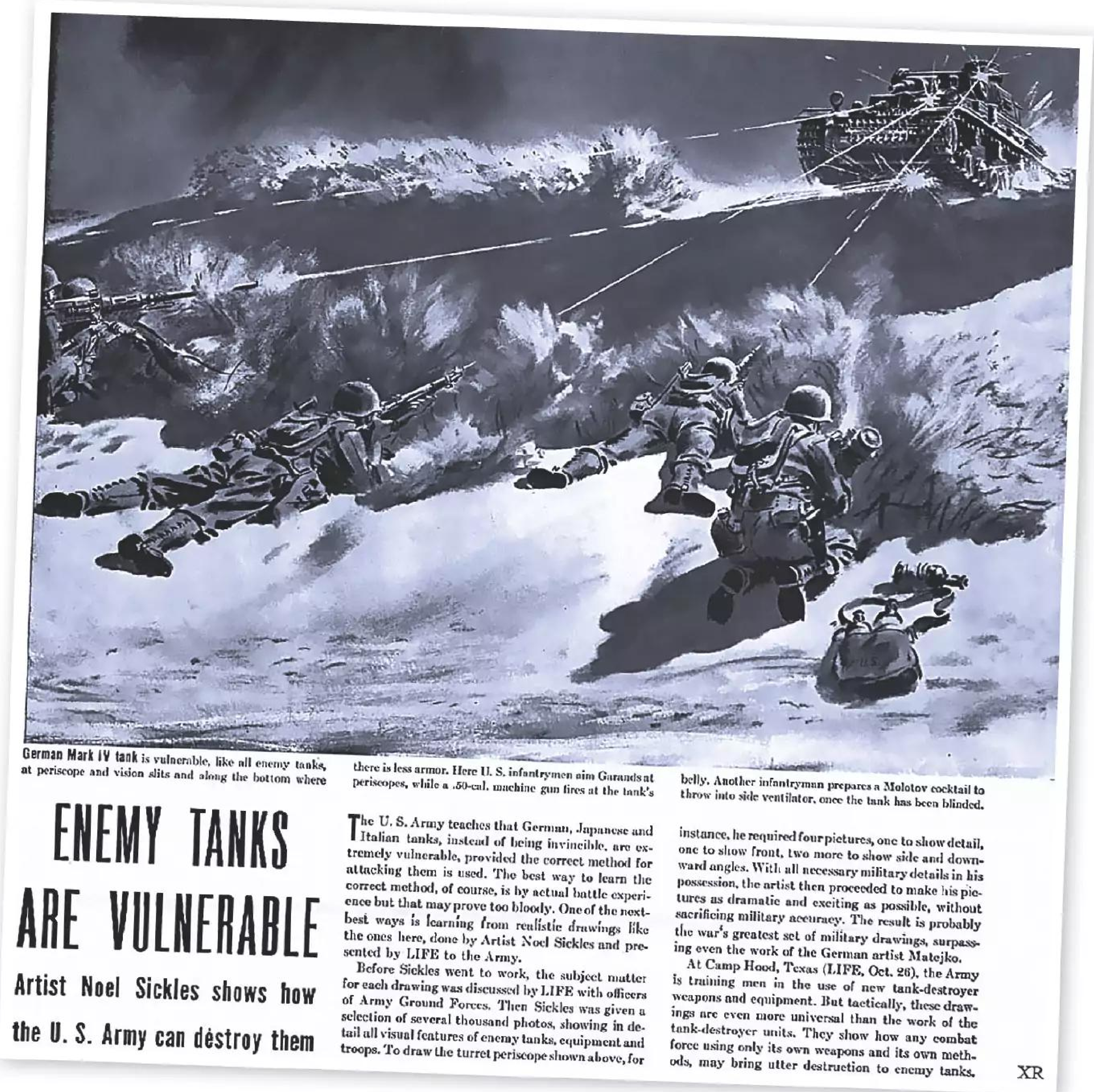
During the first year of the Soviet invasion in 1941, the Red Army went into battles with heavy

SA-KUVA

The Finnish Lahti L-39 anti-tank rifle was not strong enough despite its size.

SA-KUVA

Finnish soldiers carrying Panzerfaust examine a destroyed Soviet T-34 tank after the Battle of Tali-Ihantala in 1944.



German Mark IV tank is vulnerable, like all enemy tanks, at periscope and vision slits and along the bottom where there is less armor. Here U. S. infantrymen aim Garands at periscopes, while a .50-cal. machine gun fires at the tank's belly. Another infantryman prepares a Molotov cocktail to throw into side ventilator, once the tank has been blinded.

ENEMY TANKS ARE VULNERABLE

Artist Noel Sickles shows how the U. S. Army can destroy them

The U. S. Army teaches that German, Japanese and Italian tanks, instead of being invincible, are extremely vulnerable, provided the correct method for attacking them is used. The best way to learn the correct method, of course, is by actual battle experience but that may prove too bloody. One of the next-best ways is learning from realistic drawings like the ones here, done by Artist Noel Sickles and presented by LIFE to the Army.

Before Sickles went to work, the subject matter for each drawing was discussed by LIFE with officers of Army Ground Forces. Then Sickles was given a selection of several thousand photos, showing in detail all visual features of enemy tanks, equipment and troops. To draw the turret periscope shown above, for instance, he required four pictures, one to show detail, one to show front, two more to show side and downward angles. With all necessary military details in his possession, the artist then proceeded to make his pictures as dramatic and exciting as possible, without sacrificing military accuracy. The result is probably the war's greatest set of military drawings, surpassing even the work of the German artist Matejko.

At Camp Hood, Texas (LIFE, Oct. 26), the Army is training men in the use of new tank-destroyer weapons and equipment. But tactically, these drawings are even more universal than the work of the tank-destroyer units. They show how any combat force using only its own weapons and its own methods, may bring utter destruction to enemy tanks.

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Leaflets like this revealed the various methods of combating enemy tanks. In this example, soldiers are encouraged to fire on the tank's periscope and undercarriage.

"THE WEAPONS NOW THREATENED TO KNOCK OUT THE SHOOTER."

and medium tanks that were much better than their German counterparts. But while the German panzer troops defeated their enemies by dodging the tanks to instead target their supply lines and support, German infantry continued to battle Soviet tanks, only this time without the right weapons at their disposal. This was no fight against slow, outdated monsters as it had been in France, but instead a battle with fast, modern T-34 tanks.

German infantry had more powerful – but still not powerful enough – anti-tank guns, and while it now also received anti-tank vehicles such as tank destroyers, there were too few of them. To remedy this, Wehrmacht command determined that all men should be forced to attack and knock out tanks at any time and with whatever equipment was handy.

For example, in the manuals handed out to German soldiers, advice was given that when, for example, smoke grenades weren't available, they were to ignite fires to shroud tanks in smoke, then throw burning bundles of straw soaked in oil on to them and paint or otherwise obscure the crew's sights to blind them. It was even recommended to pull a blanket or tarpaulin over the tank; it was unclear how this should be done in practice.

The manuals concluded that the most important prerequisite for getting close to tanks was to kill or chase away the infantry that was usually found behind them. Without infantry, the vehicles had blind spots on both sides and behind them. When the tank slowed down, it was possible to get close and even jump on it – a move the manuals suggested soldiers should practice. Up on the tank they could use home-made explosives or modified hand grenades to incapacitate it, preferably by targeting the belt assembly or engine.

The manuals even suggested different variations of Molotov cocktails along with throwing anti-tank mines on to the track at the front of the ▸

Suicide weapon was effective in jungle

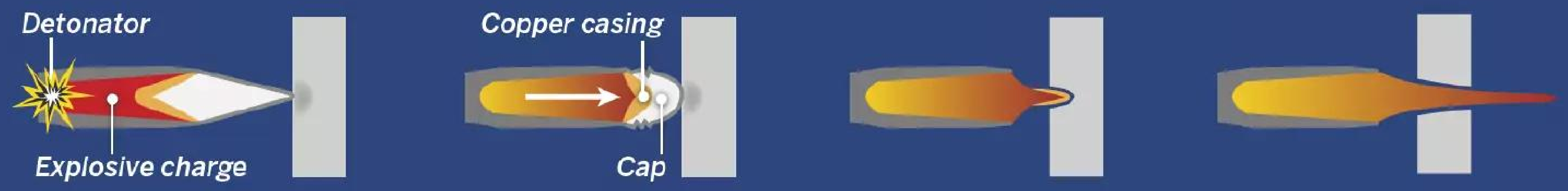
★ Japanese armoured forces in South-east Asia at the outbreak of WW II were outdated, but because China had no access to anti-tank weapons they could wreak havoc undisturbed. Early anti-tank measures by Chinese included throwing themselves underneath tanks while carrying dynamite. Reports tell of combined attacks by suicide bombers that struck several tanks simultaneously.

When the Japanese began to encounter US tanks, they immediately started using various 'lunge mines' – large HEAT warheads mounted on bamboo sticks – that detonated by lunging the mine at the tank. Lunge mines were particularly effective on Pacific islands where close combat was the norm and tanks largely functioned as slow-moving bunkers.

When the Japanese in southern Burma eventually met modern combat tanks in open terrain, they were defenceless while their blind courage, meant to offset the enemy's technical superiority, only led to even greater losses.

Lunge mines were fatal to all involved.

How shaped charges (HEAT) work



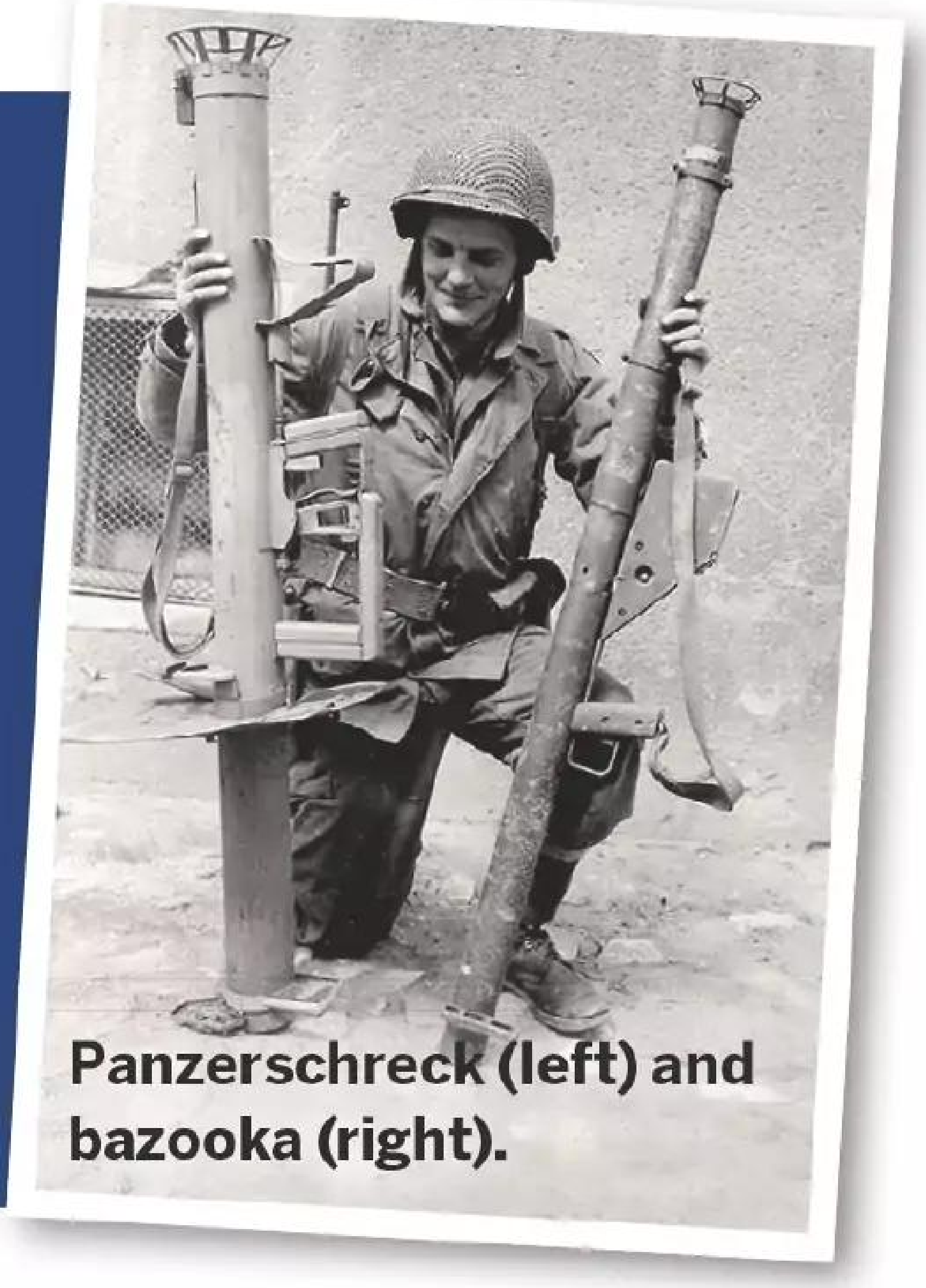
1 Target struck
When the grenade hits the target, the fuze detonates the explosive charge.

2 Detonation
The copper shell is pushed forward, and the hollow casing broken.

3 Penetration
The shell becomes a projectile focusing the explosive force to a point.

4 Breakthrough
The targeted beam penetrates through the armour into the tank hull or turret.

GRAPHIC: ERIK LINDHOLM



Panzerschreck (left) and bazooka (right).

tank carriage. The manuals failed to mention how to survive when located just a few metres from the mine as it exploded. Many of these tips and tricks were based on experiences in the Finnish Winter War, but where the Finns fought light and unmodified T-26 tanks in woodland, German troops were expected to fight modern and heavy T-34 tanks on the steppes.

The methods were obviously deadly, but there were no alternatives. The German army was careful to hand out medals and award points for tank "kills". One captain, Günther Viezenz, may have been the best having destroyed 21 tanks at close quarters. Amazingly, he survived the war.

In August 1944, a pioneer battalion received an honourable mention because it managed to take out almost 30 tanks in a single day – virtually an entire tank battalion. The mention failed to recount how few of the pioneer battalion remained afterwards. According to German calculations, around 14,000 Soviet tanks were put out of action using these primitive methods.

In the second half of the war, infantry anti-tank weapons were introduced based around shaped charges. These high-explosive anti-tank (HEAT) weapons finally gave infantry the tools to fight back, and any terrain where soldiers could get within range became death traps for tanks.

The channelling of explosives into a hollow cone to concentrate the explosive at a small point had been known since the late 1700s and was used in the mining industry from the 19th century. These 'conical charges' were first used during World War II by engineering troops – for example, one exploded in the Belgian fort at Eben Emael. It soon become apparent this technology could also be used to blow holes in tanks – if the explosive charge could be fixed to the chassis.

A German magnetic mine that used HEAT warheads was a step forward, but a soldier still had to get close enough to get on to the tank. Different hand grenades were developed with HEAT charges, but their weight – required to provide enough impact – meant they were difficult to throw. One had to stand upright and be close to the target to deploy them, two acts that were fatal on the battlefield.

The breakthrough with HEAT weapons came with the German *Panzerfaust*, a single-use weapon that became the predecessor of today's rocket-propelled grenades (RPGs). The weapon was rocket-propelled to make it recoil-free. Instead of having a piece at the back of the tube to take most of the recoil on firing, most of the propellant's power was shot out behind the weapon. What sounds like a gigantic waste of energy actually meant it was now possible to fire large grenades without potentially killing the shooter.

The RPG's grenade didn't actually have to travel particularly fast to be effective – it was enough it reached its target. The *Panzerfaust*, which had an effective range of around 50 metres, was a revolution and became increasingly effective during the war. It was also easy to use. A famous picture shows Hitler handing out medals to young Nazi Youth boys during his last public appearance outside the Reichstag in April 1945. They were defending Berlin armed with nothing but *Panzerfaust*.

In the United States, its bazooka rocket launcher began to emerge around the time the country joined the war in Europe. It used a different method of launching the HEAT charge. Using a smaller charge, a rocket was fired, which flew the charge to its target. It's the same principle used today in Russian RPG weapons. German forces came across bazookas early – these were sent back home for examination and became the model for the *Panzerschreck*, a similar type of weapon.

The infantry's best anti-tank weapons during World War II were not usable at distances of more

The Soviet anti-tank guided missile 9M14 Malyutka (NATO reporting name AT-3 Sagger) has been in use since 1963.

GETTY

than 150 metres, and most were effective only at short distances, where they were also dangerous to those firing them. In addition, they sent out large amounts of smoke and fire that made the shooter an easy target for a tank's machine guns. They were usually effective at four or five times the distance of a tank. By comparison, in the second half of the war, the effective range of a tank's gun stretched to over two kilometres.

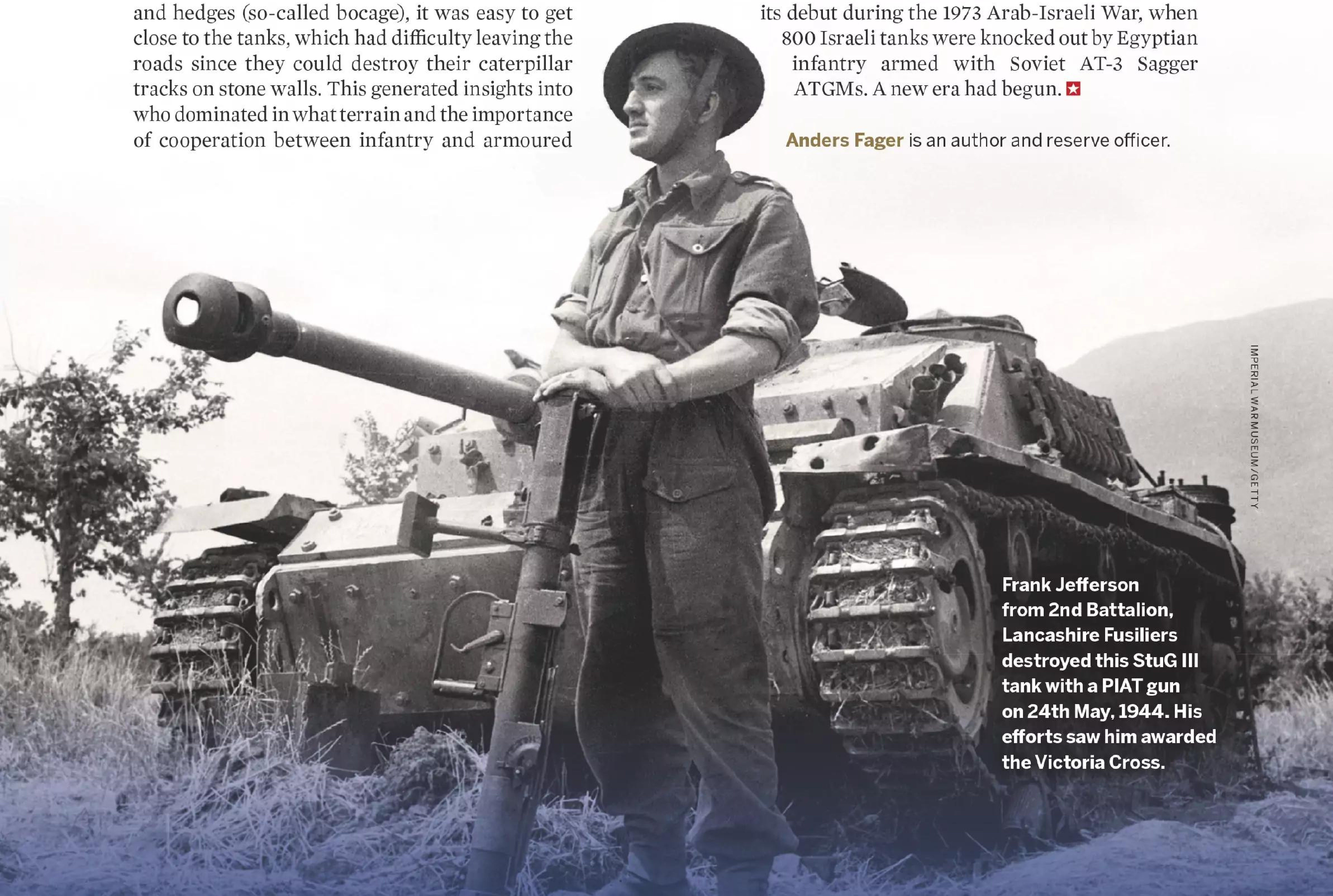
> **"THE INFANTRY'S BEST ANTI-TANK WEAPONS... WERE NOT USABLE AT DISTANCES OF MORE THAN 150 METRES."**

If the infantry were to attack tanks, it was important to come close, particularly in wooded or urban areas. In Normandy, where the terrain often consisted of small fields surrounded by walls and hedges (so-called bocage), it was easy to get close to the tanks, which had difficulty leaving the roads since they could destroy their caterpillar tracks on stone walls. This generated insights into who dominated in what terrain and the importance of cooperation between infantry and armoured troops. That interaction became a crucial factor – then as now.

Mines, the bazooka and armour-piercing shells were the weapons the infantry had to battle tanks from the end of World War II into the 1960s.

The anti-tank guided missile (ATGM) made its debut during the 1973 Arab-Israeli War, when 800 Israeli tanks were knocked out by Egyptian infantry armed with Soviet AT-3 Sagger ATGMs. A new era had begun.

Anders Fager is an author and reserve officer.



IMPERIAL WAR MUSEUM/GETTY

Frank Jefferson from 2nd Battalion, Lancashire Fusiliers destroyed this StuG III tank with a PIAT gun on 24th May, 1944. His efforts saw him awarded the Victoria Cross.

PIAT – smokeless and silent heavyweight

One of the strangest ways to fire off a HEAT grenade was to use the British PIAT (Projector, Infantry, Anti Tank).

This was a 15-kg tube-like weapon that used a coil spring to project the HEAD shell in the same way a toy gun fires an arrow with a suction cup. In theory, the grenade could be thrown almost 100 metres, and with a little luck it would hit a tank if it was stood still. But the PIAT was heavy and targets were almost impossible to hit because it lacked both accuracy and reliable fuzes.

However, because the PIAT was virtually silent and smoke-free, it was possible to get off another shot before the tank crew spotted it.

SOVIETS

Stalin wasn't

Operation Barbarossa in 1941 signalled the start of some of the largest and most unforgiving battles in history. The invasion marked the beginning of the end for Hitler's domination of Europe.

TEXT **NICLAS SENNERTEG**

Waffen-SS soldiers in camouflaged uniforms on the Eastern Front, summer 1941.

ULLSTEIN/ALL OVER PRESS

> **"Infantry and artillery broke up the Soviet defence's guns and tank columns then rolled through at top speed"**

INVADED

prepared for German offensive

By the summer of 1940 Germany controlled most of Europe. Many countries were occupied by German troops, while the likes of Hungary and Slovakia had entered into an alliance with Germany. A few countries, such as Sweden and Switzerland, were neutral. The only nation that still found itself at war with Germany was Great Britain, who refused to agree to any peace treaty. Although Britain stood alone, the country was still a powerful opponent, with its large fleet and colonies worldwide.

Britain's stubborn attitude put Hitler in a difficult situation. The United States superpower still stood outside the war, but might join the British in the future if they were able to keep going. And if this happened, it would only be a matter of time before Germany lost the upper hand that the country currently held.

SZ PHOTO/IBL

Adolf Hitler and his generals study maps during the German campaign against the Soviet Union.

War on two fronts was dreaded

Hitler feared a war on two fronts just as much as his generals, since a single war on two fronts had contributed to Germany's defeat in WWI.

Several of Hitler's top generals were appalled that they were about to march in Napoleon's footsteps, towards Moscow. The uninterrupted succession of German victories, however, had made Hitler overconfident, and he'd noted with interest how inept the Red Army had been during the Winter War with ►

ULLSTEIN/ALL OVER PRESS

German armoured divisions in the Soviet Union during Operation Barbarossa in 1941. In the background smokes rises from a city.

Finland. The Führer suspected that Winston Churchill harboured hopes the Soviet Union would attack Germany, and feared that Stalin might have already formed an alliance with Britain.

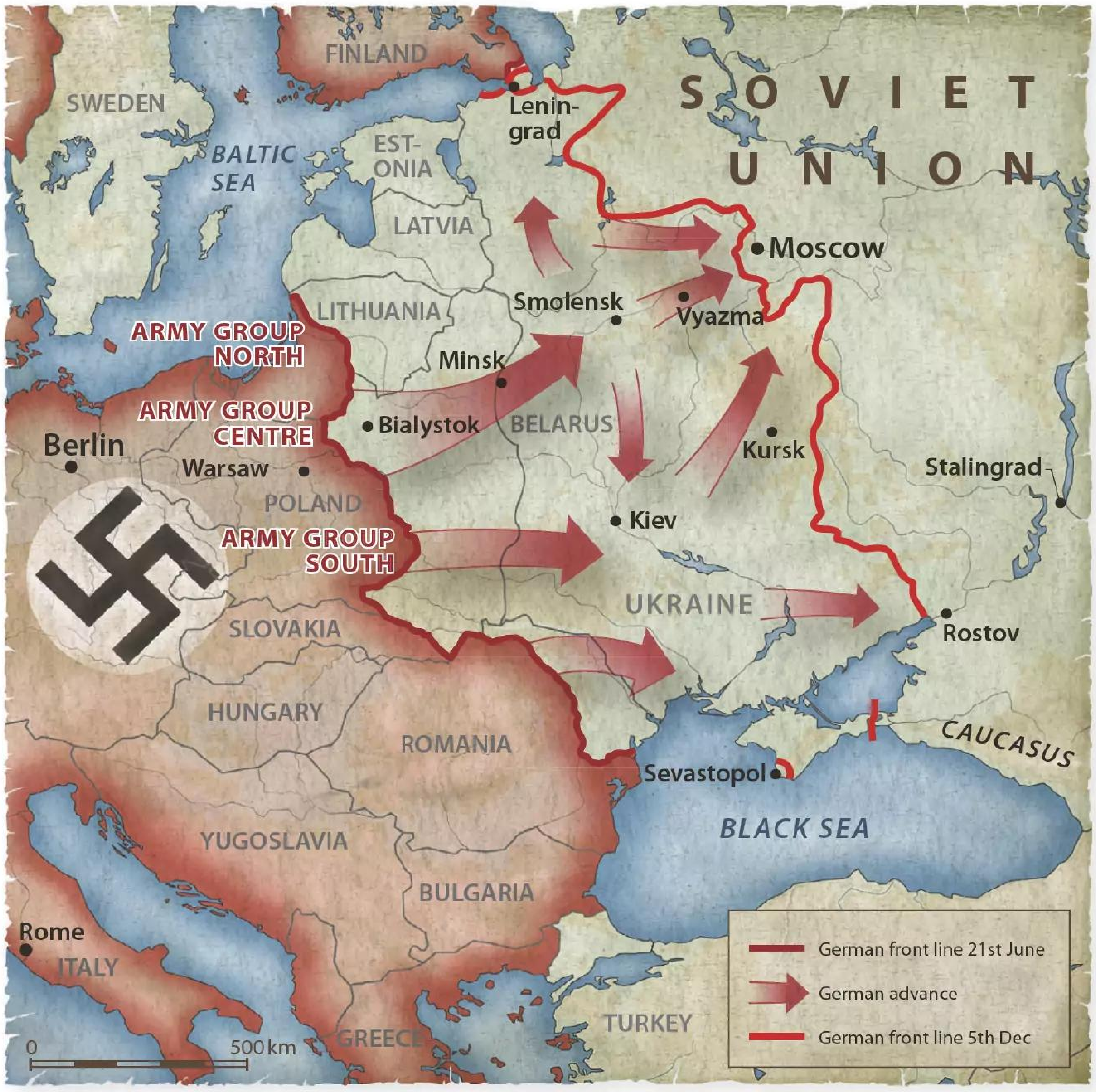
"Over in a few weeks"

Hitler was a gambler, and so decided to strike first while the enemy was still weak and not expecting an attack. He counted on a campaign against the Soviet Union that would be over in a few weeks or months.

Such a victory would deprive Britain of its last hope of getting help in the fight against the German power. In addition, Germany would gain control of important raw materials and slave labour for the armaments industry that could be utilised in the final trial of strength against the British.

On 18th December, 1940 Hitler issued secret military directive number 21, which began with the words: "The German Armed Forces must be prepared, even before the conclusion of the war against England, to crush Soviet Russia in a rapid campaign".

The invasion would begin on 15th May, 1941, and the military preparations began immediately, in strict secrecy.


SOVIET UNION
FINLAND
SWEDEN
BALTIC SEA
ESTONIA
LATVIA
LITHUANIA
Leningrad
Moscow
Smolensk
Vyazma
Minsk
ARMY GROUP NORTH
ARMY GROUP CENTRE
Berlin
Warsaw
Bialystok
BELARUS
Kursk
Stalingrad
POLAND
ARMY GROUP SOUTH
Kiev
UKRAINE
Rostov
SLOVAKIA
HUNGARY
ROMANIA
CAUCASUS
Sevastopol
BLACK SEA
YUGOSLAVIA
BULGARIA
Rome
ITALY
GREECE
TURKEY
0
500 km
German front line 21st June
German advance
German front line 5th Dec

SVANTESTRÖM

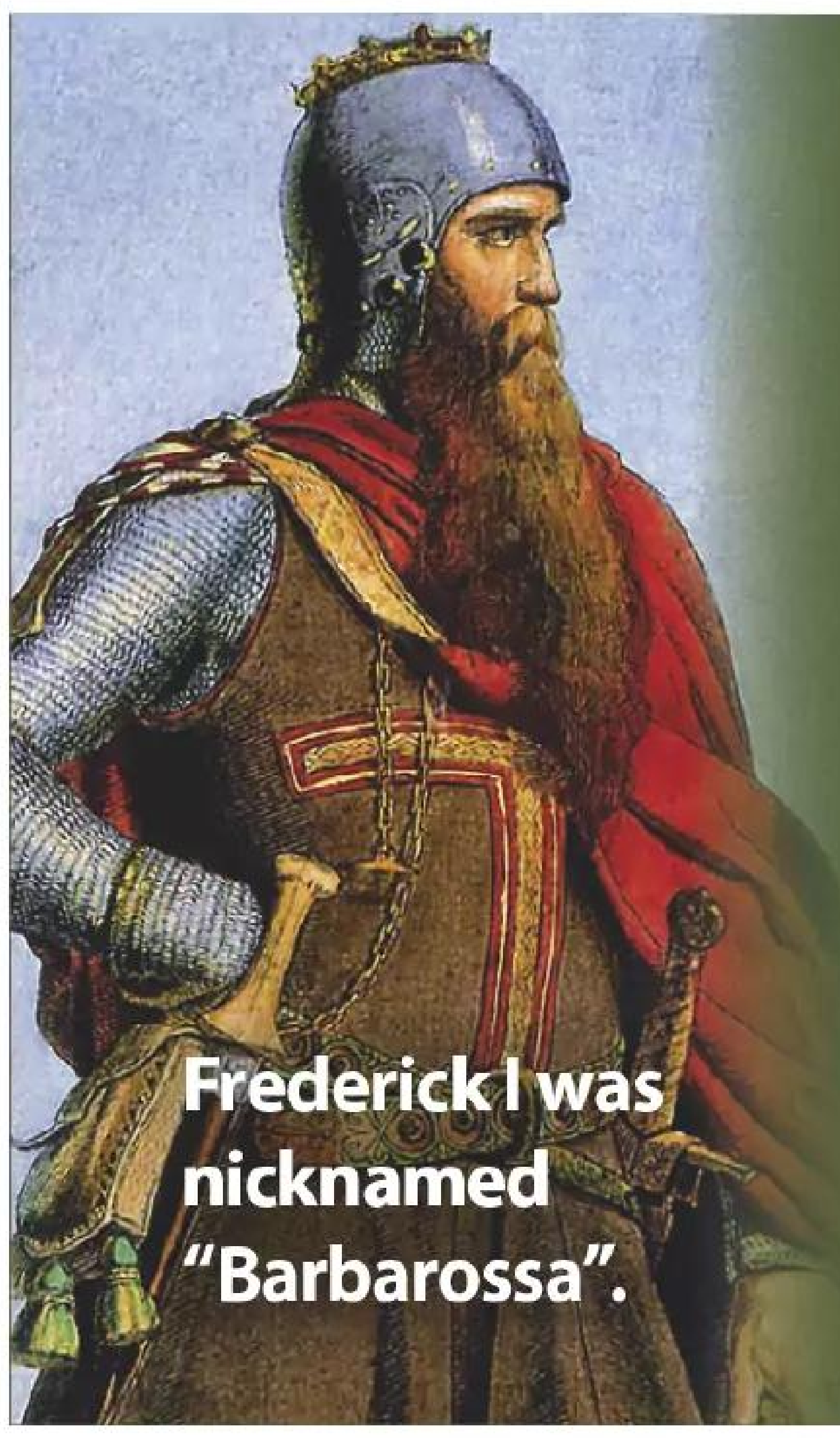
The attack against the Soviet Union took three routes: toward Leningrad in the north, Moscow in central Russia and Ukraine to the south.

Russia would be colonised

All Hitler's strategic deliberations coincided with his old dreams to crush communism, exterminate the Jews and colonise Russia as far as the Ural mountains with Germanic peoples. Therefore, preparations didn't follow the usual pattern of a war of conquest – this would be a racist extermination war with an all-out attack on eastern European civilisation.

Heinrich Himmler organised SS special murder squads – the Einsatzgruppen were to execute all Soviet functionaries who were "less valuable Asiatics, Gypsies and Jews". In a meeting with some SS generals at Wewelsburg castle before the invasion Himmler explained that he estimated that 30 million civilian Slavs would die under their new German masters.

A series of secret orders to the military forces followed the same lines: these included the army executing all Communist party functionaries – the so-called political commissars – in the Red Army. German soldiers were

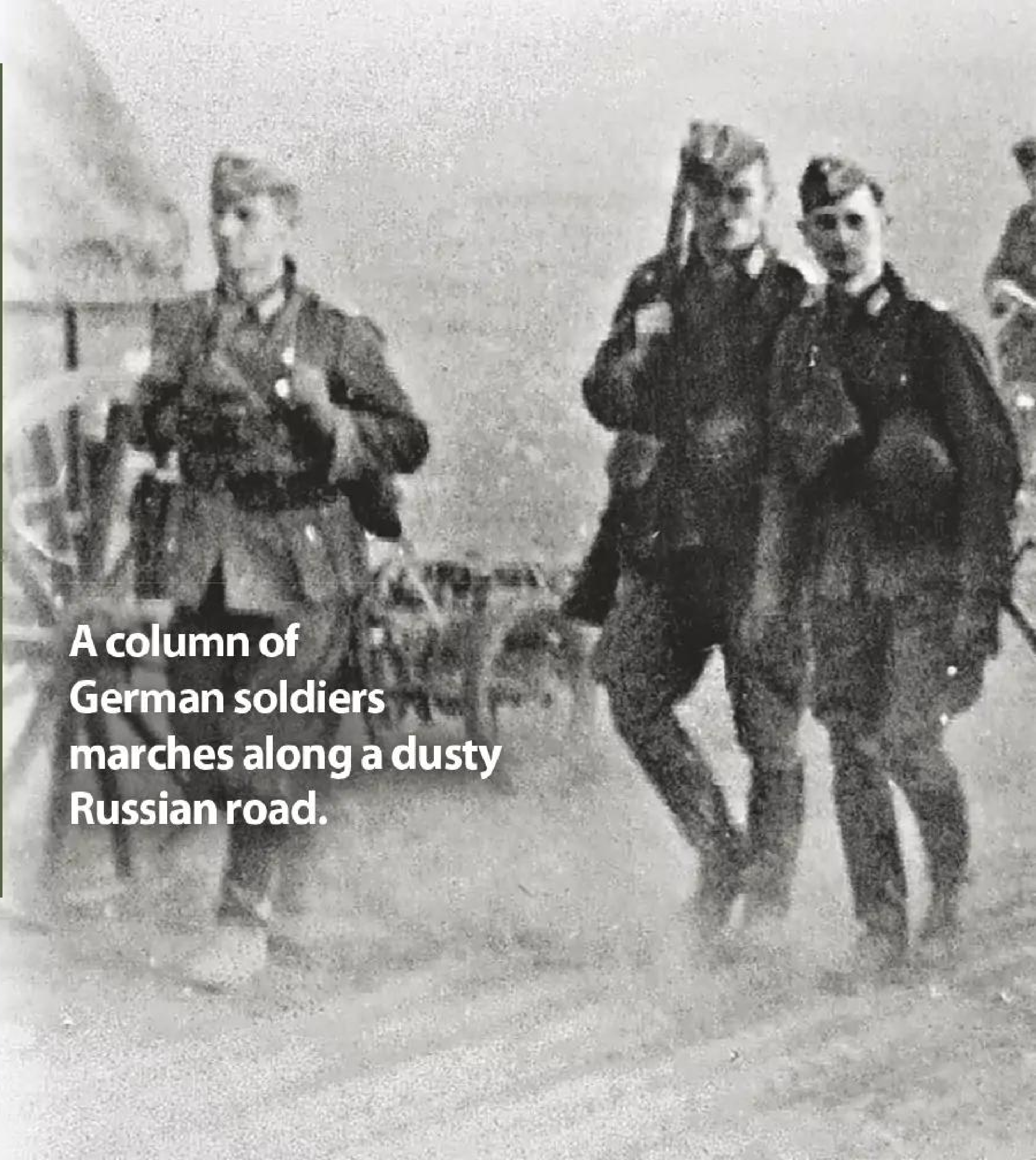


Frederick I was nicknamed "Barbarossa".

German Roman Emperor gave his name to operation

Hitler's plan for the invasion of the Soviet Union was named after the Holy Roman Emperor Frederick I (1122-1190), who had been nicknamed "Redbeard" (Barbarossa) because of his beard while in Italy.

Emperor Barbarossa was one of Hitler's role models in German history, perhaps because he tried to grow his power through intrigue and military campaigns in countries like Italy. He drowned in a Turkish river as he headed towards Jerusalem on crusade.



A column of German soldiers marches along a dusty Russian road.

Victims lie in Lviv in modern-day Ukraine.

ULLSTEIN/ALL OVER PRESS

A Soviet infantryman helps a wounded comrade.

MARY EVANS/IBL

also given this so-called "Commissar Order", which in practice gave them impunity against Russian civilians.

Three attacks were planned: Leningrad for military strategic reasons, Moscow to break the enemy's morale, and an invasion of Ukraine to gain control of the fertile soil there and capture the oil fields in the Caucasus.

Forces were referred

During the spring the German army deployed 4,300,000 soldiers (including 500,000 Romanians, Slovaks, Hungarians, Croats and Italians) along the border with the Soviet Union, from the Baltic Sea in the north to the Black Sea in the south.

Ground troops were organised into three army groups, one for each of the attack routes: Army Group North under Field Marshal Wilhelm von Leeb would advance through the Baltics towards Leningrad, Army Group Centre under Field Marshal Fedor von Bock would move towards Moscow, while Army Group South under Field Marshal Gerd von Rundstedt would advance through Ukraine. Since Hitler expected a quick victory, the soldiers were not given winter clothing. It was a decision that would have catastrophic consequences.

In the western parts of the Soviet Union there were barely 3.3 million Soviet soldiers, fewer than the Germans. The Red Army had greater access to munitions. At 03.15 on 22nd June, 1941, the invasion started, just over a month later than originally planned.

Did you know...

Hitler modelled his plans to create German "Lebensraum" in the Urals on the British colonial empire in India. He also had plans to spread other Germanic people – including Swedes, Danes and Norwegians – to the east.

Despite the fact that Stalin had received several warnings about what Germany had planned, both from his own spies and the British, Soviet border defences and the air force were caught completely off guard when the attack began. The otherwise morbidly suspicious Stalin had refused to believe that his fellow dictator would deceive him. This mistake would cost the lives of millions of Soviet Russians.

Blitzkrieg rolled forward

From the start the German blitzkrieg advanced swiftly. Infantry and artillery smashed holes in the lines of the Soviet defence, and tank columns rolled through these at top speed. Meanwhile the Luftwaffe buzzed around the enemy ▶

"During the spring the German army deployed 4,300,000 soldiers"

ULLSTEIN/ALL OVERPRESS

attacking targets in close cooperation with the ground forces. At the same time, German aircraft managed to practically wipe out its Soviet adversary.

The Germans destroyed around 3,000 Soviet aircraft in just three days. Within six months the Germans had almost total air supremacy, and Soviet ground operations were severely hampered.

Army Group North advanced through the Baltics and in August stood at Estonia, while Army Group Centre encircled large Soviet troops at Bialystok and Minsk.

After only five days the Army Groups had penetrated 300 kilometres into Soviet territory, and had covered a third of the long road to Moscow.

SZ-PHOTO/IBL

BUNDESARCHIV (2)

Hundreds of thousands of Soviet soldiers were taken PoW during the first week of the invasion. To the left are the German field marshals von Bock and von Rundstedt.

Counterattack ordered

Soviet defence commissar, Marshal Semyon Timoshenko, ordered a counterattack across the front to repel the invaders. This attempt was a complete failure, partly due to confusion and a lack of coordination between the various divisions.

Time and again during Operation Barbarossa the Germans succeeded – with mobile armoured divisions at their head – in surrounding and crushing large concentrations of Soviet troops. After only a week of fighting the Soviet Union had lost about 600,000 soldiers – fallen, wounded or prisoners of war – while German losses were smaller.

On 26th July Army Group Centre encircled three Soviet armies at Smolensk. About 180,000 Russian soldiers were captured, but 100,000 escaped the Germans' grip and continued to delay the German advance. In late August Army Group North stood just 50 kilometres outside Leningrad, but the Soviet defences hardened the closer German troops got to the City. In early September, Hitler lost patience and ordered that the city would no longer be stormed but starved out and flattened instead. He then gave orders for the offensive against Moscow to continue.

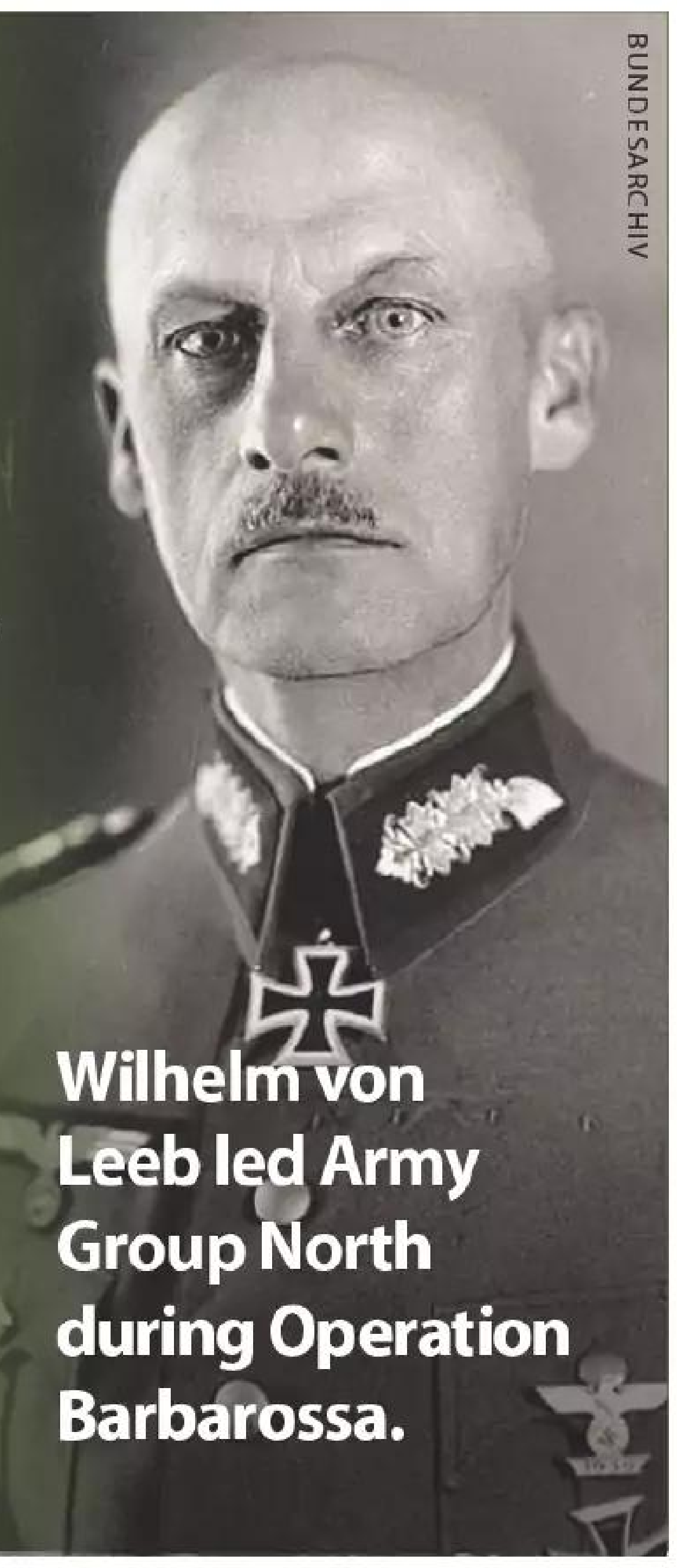
First, though, major Soviet forces outside Ukraine's capital Kiev were crushed. On 16th September, they were encircled and defeated in fierce fighting. After the Battle of Kiev on 2nd October Army Group Centre began Operation Typhon, the final offensive against Moscow. A few days later, four Soviet

ULLSTEIN/ALL OVER PRESS

German anti-aircraft artillery in June 1941 at the town of Hrodna (modern-day Belarus).

armies had once more been surrounded. Thus about three million Red Army soldiers had been captured since 22nd June. Most of them starved to death in German prison camps.

Unhappy field marshal took sick leave from the front


BUNDESARCHIV

Wilhelm von Leeb led Army Group North during Operation Barbarossa.

Prussian military tradition dictated that an officer who had reached the highest level of field marshal could never retire. A field marshal was virtually always on the job regardless of age or health.

Therefore, it caused a stir when the commander-in-chief of the German forces at Leningrad, Field Marshal Wilhelm von Leeb (1876-1956), took sick leave in January 1942 because of disagreements with Hitler. This was the first time a German field marshal had taken such a step. Soldiers had no opportunity to walk away, but had to continue fighting until they fell, were wounded or taken prisoner.

The weather deteriorated

On 13th October German troops were only 22 kilometres from Moscow and martial law was introduced in the city. The weather was deteriorating. Autumn rain poured down and the temperature dropped. The roads became impassable mud, and the Germans managed to cover just three kilometres a day.

The vehicles carrying supplies, ammunition, fuel and food, were also stuck in the mud, as the situation became critical. On 31st October Hitler ordered a break in the offensive while the troops were reorganised.

The respite, however, gave the Russians time to move large forces into Moscow, including many who came directly from Siberia. When Operation Typhon was resumed on 15th November, the ground had frozen. Nevertheless, German forces started to slowly and inexorably surround Moscow from the north-west, but Russian defences in the capital proved unexpectedly tough.

ULLSTEIN/ALL OVER PRESS

German forces in the outskirts of Moscow in early December 1941. Left: Marshal Semyon Timoshenko.

Kremlin domes were in sight

On 2nd December part of the German 258th Infantry Division was just 24 kilometres from the centre of Moscow and could see the Kremlin's domes glistening in the sun. Then, however, came heavy snow and the temperature dropped dramatically, causing the attack to grind to a standstill. The German soldiers had no winter uniforms, so suffered terribly in the cold, and many froze to death or were badly affected by frostbite. It was so cold that German tanks and trucks had to stand idling around the clock, because it was otherwise impossible to start them in the morning. On 5th December 500,000 Russian soldiers counterattacked from Moscow, driving the German troops back from the suburbs. Throughout the winter heavy fighting continued along the entire Eastern Front. This time, however, the German forces were on the defensive.

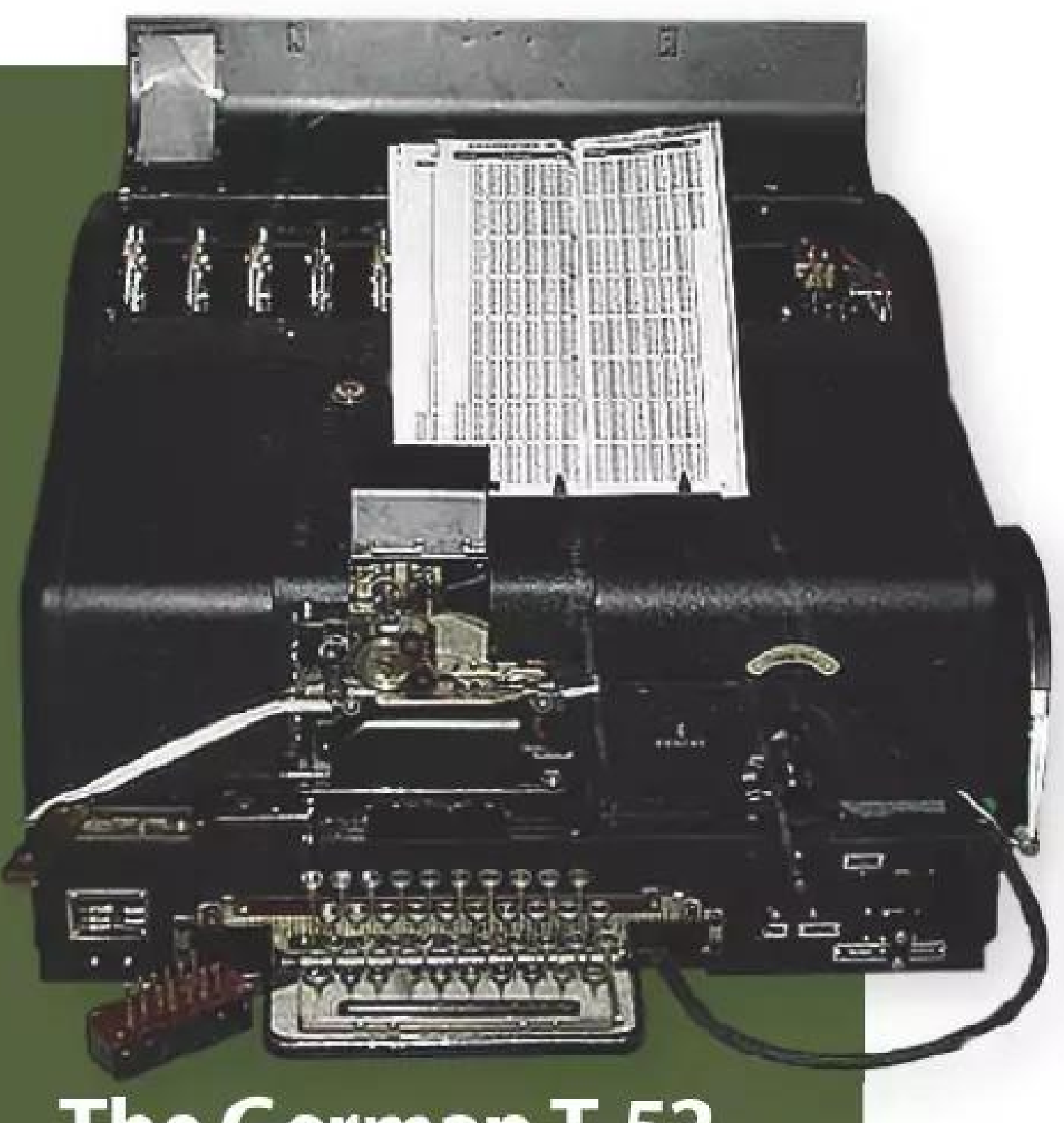
Given that the German offensive was stuck in the mud and snow, Operation Barbarossa was over. It had cost Germany 250,000 slain and 500,000 wounded – the vast majority of these losses occurred during the last three months of the year. Soviet losses were far greater: at least 800,000 fallen (probably more), three million wounded and 3.3 million prisoners of war. ✪

FURTHER READING

Barbarossa by Alan Clark (1965) • ***Operation Barbarossa and Germany's Defeat in the East*** by David Stahel (2009)

Barbarossa exposed by a Swedish mathematician

In the summer of 1940 Swedish mathematician Arne Beurling cracked the German T-52 Geheimschreiber (a cipher machine like the Enigma) in just two weeks using only pen and paper. Swedish officers took him encrypted German messages for them to be deciphered. The German army used Swedish telephone lines to send teleprinter traffic to the troops in Norway and its allies, Finland, and the Swedish Armed Forces intercepted the messages. Despite not understanding how the machine was designed or the code system it used, Beurling managed to crack the code, which the Germans thought was even more secure than that produced by the more famous Enigma machine. Thanks to Beurling's efforts the Swedish government got advance knowledge of the invasion.



The German T-52 Geheimfernschreiber.

BUILT FOR VICTORY

Tiger I units from 2nd Company, 101st Heavy SS Panzer Battalion on the morning of 7th June, 1944. The tanks used winding country tracks to travel to Normandy via Paris.

LEONE/ULLSTEIN/IBL

It was expensive and only 1,300 units were ever produced, but the Tiger I achieved legendary status on the battlefield during World War II thanks to its heavy armour and powerful gun.

Text: **HARALD SONESSON**

The intense battle between action and reaction is a strong driving force in weapon development. The Battle of France in 1940 had shown the Germans that they needed better armed tanks to combat the Allies' heavy units, such as the French Char B1 bis and the British Matilda.

Equally clear was the fact that the armour on the Germans' mainstay tank of the period, the Panzer III, and the unit it supported, the Panzer IV, offered inadequate protection. There was limited scope to mount larger guns on the existing hulls, but the most serious problem was that the armour plating could not be strengthened sufficiently: it wasn't possible to add the extra cladding required to withstand the enemy's guns while retaining an acceptable ground pressure and an adequate weight-to-engine ratio.

German engineers instead fed the requirements into a project that was already in progress. This reduced the development time and ►

► in the first German-made tank of the war: the *Panzerkampfwagen VI Ausführung H* (Panzer VI version H) or the Tiger I as it later became known.

Despite the fact that only relatively few Tiger I units were produced – just over 1,300 in total – it became one of the most feared machines of World War II. Allied tank crews knew their armour was no match for the Tiger's gun and that a crippling shot was only possible if they were blessed with highly favourable conditions. UK and US tank units were especially apprehensive about encountering a Tiger. Other models were frequently misreported as being Panzer VIs and when a radio operator announced a confrontation with Tigers, fear would spread rapidly through the Allied forces in the area.

The Tiger originated on the drawing boards of Henschel and Sohn. The company was commissioned in 1937 by *Waffenamt* (the German army's weapons agency) to develop a prototype *Durchbruchwagen* (breakthrough vehicle). The assumption was that the new tank would be 50 percent heavier than the Panzer IV and carry 50mm-thick armour plating.

In autumn 1939, Daimler-Benz, Porsche and Henschel were all invited to submit ideas. The fact that several companies participated in the projects was, in part, because German industry was not yet in 'war mode'. The breadth of experience that the various companies brought to bear on the project meant that Waffenamt was able to test various technical solutions. The different proposals led to several experimental vehicles that were completed in the spring of 1940. By March 1941, Henschel delivered the first prototype hull, but work was interrupted two months later, when Henschel and Porsche were given a new specification.

Following the previous year's campaign, Waffenamt realised it needed an entirely new battle tank to spearhead its armoured divisions.

THE NEW SPECIFICATION demanded a gun that could penetrate 100-mm armour plating at a range of 1,500 metres, while the frontal section needed to be capable of withstanding equivalent firepower. The original gun slated for the Tiger I was designed to use armour-piercing shells made from tungsten, a commodity that was becoming increasingly rare as the war progressed, and so the specification was changed again in July 1941.

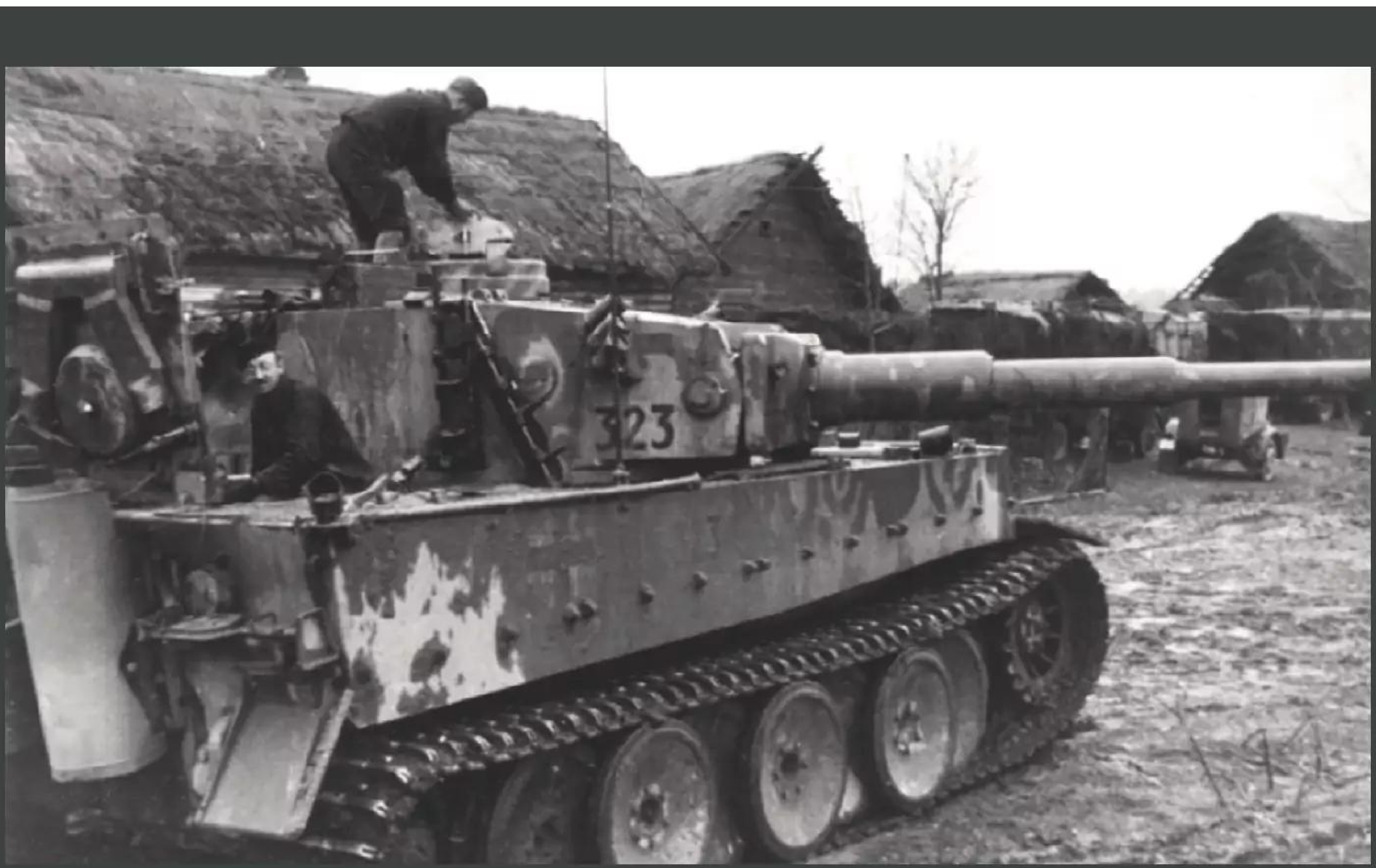
Henschel and Porsche were now tasked with designing hulls for a 45-tonne tank. Meanwhile, following Hitler's belief that two simultaneous lines of development would increase the chance of a successful outcome, the companies MAN and Daimler continued to work on their own model that eventually led to the Panzer V Panther.

In keeping with Porsche's tradition of naming its vehicles after cats, the company's internal project name for the Panzer VI was Tiger, which later became the official name of the new tank. (The Roman numeral was added after development started on its successor: the Tiger II.)

The task of developing the turret was given to the manufacturing company Krupp. The gun chosen was a 56-calibre long 88-mm KwK 36, which was based on the successful 88-mm Flak 36 anti-aircraft gun. Ordered that the new designs should be available for viewing on Hitler's birthday, the

BERND LOHSE/BUNDESARCHIV, BILD 146-1975-080-22

With a mighty gun and thick armour, the Tiger was a feared enemy.



RICHARD KAMM/BUNDESARCHIV, BILD 101I-457-0056-12

On the side of the turret you can see smokers. The 'bows' on the corner of the tank are launching devices for s-mines.

This is a Tiger prototype derived by Porsche, one of the manufacturers commissioned to develop the heavily armoured hull.

The Porsche Tiger prototype was used as the foundation of 90 anti-tank guns that were later renamed Elefant.

Henschel and Porsche prototypes were rolled out on 20th April, 1942.

PRODUCTION BEGAN almost immediately before any real testing could be carried out. The first deliveries were due in July, but manufacturing was halted after only five vehicles were complete due to problems with the engine and belt assembly.

Minor modifications continued to plague Henschel's production, with six revisions being made in 1942 alone. By 12th May, 1943 only 285 tanks had been delivered. The production of Porsche Tigers was eventually stopped entirely in favour of the Henschel model, but their completed hulls were used as the foundation of 90 anti-tank guns built under the project name Ferdinand, Porsche's first name. These anti-tank models were modified in 1943 and re-christened *Elefant* ('Elephant'). Henschel's Tiger continued production until August 1944, delivering 1,355 units, including prototypes.

By February 1942, two companies were established to take delivery of the new tank. In May 1942, these two formations were rolled into the 501st Heavy Panzer Battalion (*schwere SS Panzerabteilung 501*) alongside two companies of Panzer III tanks for reconnaissance and close support work. The 502nd and 503rd Heavy Panzer ▶

"WHEN A RADIO OPERATOR ANNOUNCED A CONFRONTATION WITH TIGERS, FEAR WOULD SPREAD RAPIDLY"

VACK/BUNDESARCHIV, BILD 101I-310-0898-25

The Tiger was highly reliable assuming that the crew had time for the demanding maintenance work. The image shows repair work, possibly after a mine detonation.

BUNDESARCHIV, BILD 146-1978-107-06

With a 12-cylinder petrol engine, the Tiger could reach speeds of 45 km/h.

Battalions were set up along the same lines later in the month.

THE TIGER WAS USED IN COMBAT for the first time near Leningrad. By autumn 1941, the Germans controlled a corridor of land several kilometres wide around the south side of Leningrad up to the shores of Ladoga Lake. With troops from Finland blockading the northern side, Russia's second city was almost surrounded and virtually all its supply routes had been cut. The Soviets weren't going to abandon Leningrad without a fight, though, and on 24th August, 1942, the Red Army launched a major attack from the east in an effort to break the siege.

On 29th August, 1942, four Tigers and several Panzer IIIs from the 1st Company, 502nd Heavy Panzer Battalion arrived on the Eastern Front at the town of Mga. They were accompanied by a support team from Battalion HQ and the workshop company. Mga lay three kilometres south of Ladoga Lake, where Army Group North was stationed. The four Tigers were immediately put into action, but three suffered technical malfunctions and had to be rescued during the night. It was hardly an inspiring debut. By 16th September, the technical issues had been resolved and two days later, three more Tigers arrived from Germany.

On 22nd September the Tigers were put into action again. Supported by Panzer III tanks, four Tigers were tasked with spearheading the armoured assault as 170th Infantry Division attacked Russian troops trapped near Tortolowo. Major Richard Märker – soon to be commander of the 502nd – protested that the terrain was far too soft for heavy tanks, but his advice went unheeded and he was forced to lead the attack through the boggy woodlands.

One Panzer III was crippled almost immediately, then a Tiger was struck. The shell didn't penetrate the hull's thick frontal armour, but it stopped the engine and the crew were unable to restart it. The other three Tigers achieved their first objective, but were then either knocked out or became stuck in the mud just as Märker had feared.

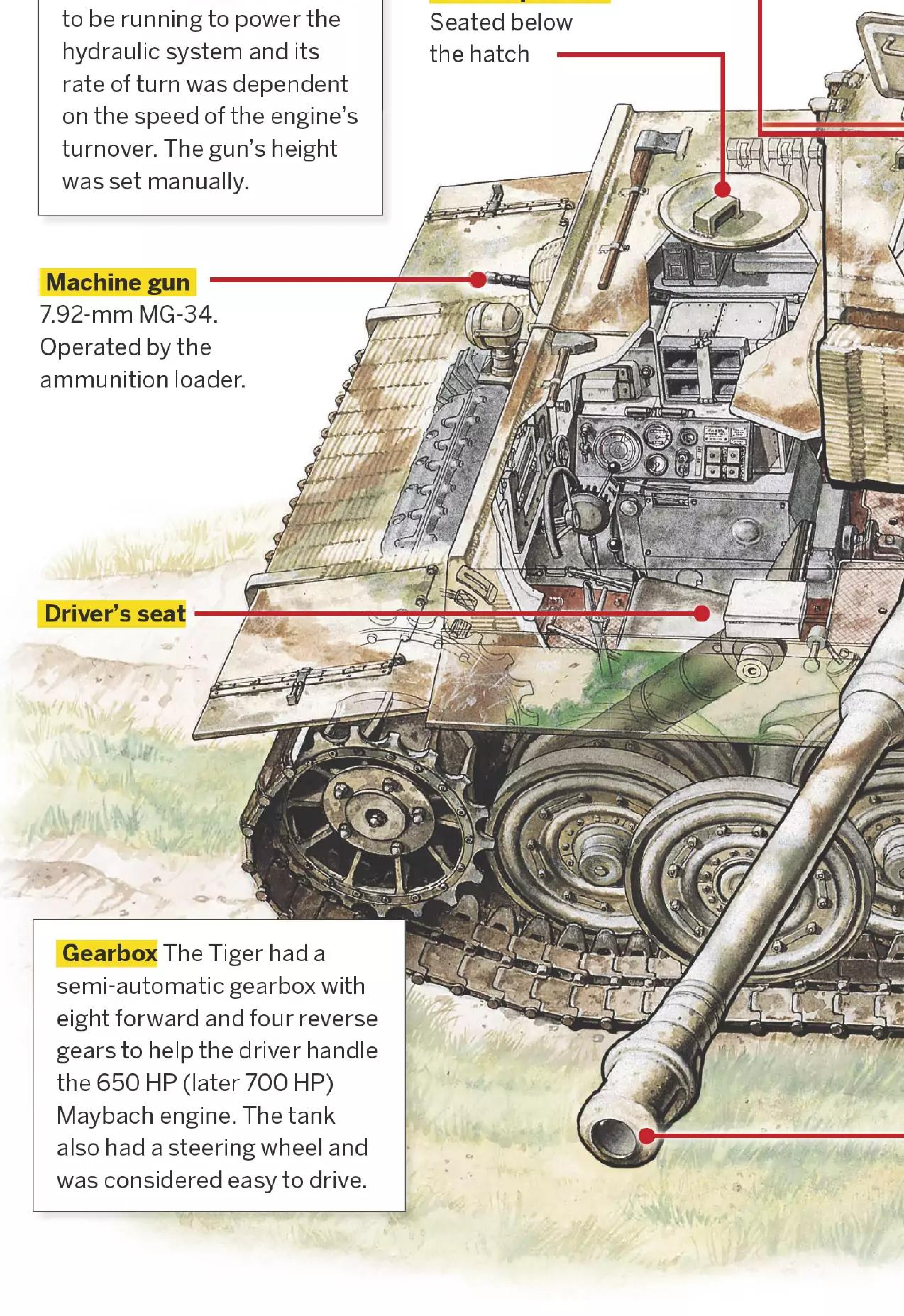
ALL THE TANKS EXCEPT ONE were eventually recovered, but while attempts were made to rescue the stalled Tiger, the Germans were unable to restart its engine and were forced to blow it up to prevent its secrets falling into Russian hands.

The terrain wasn't the only problem, however. The Tiger crews had only been allowed three days of training with the new models before they were transported to the Eastern Front. Teething problems that could have been easily handled and corrected on a training field in Germany, were now occurring under real combat conditions and the ►

Boxy, like its

The Tiger I had an angular construction with only slight slopes in the armour plates on its hull.

It didn't have the strongly inclined frontal armour present on the Soviet T-34, and its German 'copy' the Panzer V Panther. It was, instead, a development of the Panzer IV, and was already on the drawing board before the Germans knew of the existence of the Soviet T-34. Unlike the Panther, which was commissioned in late November



Turret The turret could be turned manually with a handle or hydraulically with a pedal. The engine needed to be running to power the hydraulic system and its rate of turn was dependent on the speed of the engine's turnover. The gun's height was set manually.

Machine gun 7.92-mm MG-34 Parallel to the gun

Radio operator Seated below the hatch

Machine gun 7.92-mm MG-34. Operated by the ammunition loader.

Driver's seat

Gearbox The Tiger had a semi-automatic gearbox with eight forward and four reverse gears to help the driver handle the 650 HP (later 700 HP) Maybach engine. The tank also had a steering wheel and was considered easy to drive.

predecessors

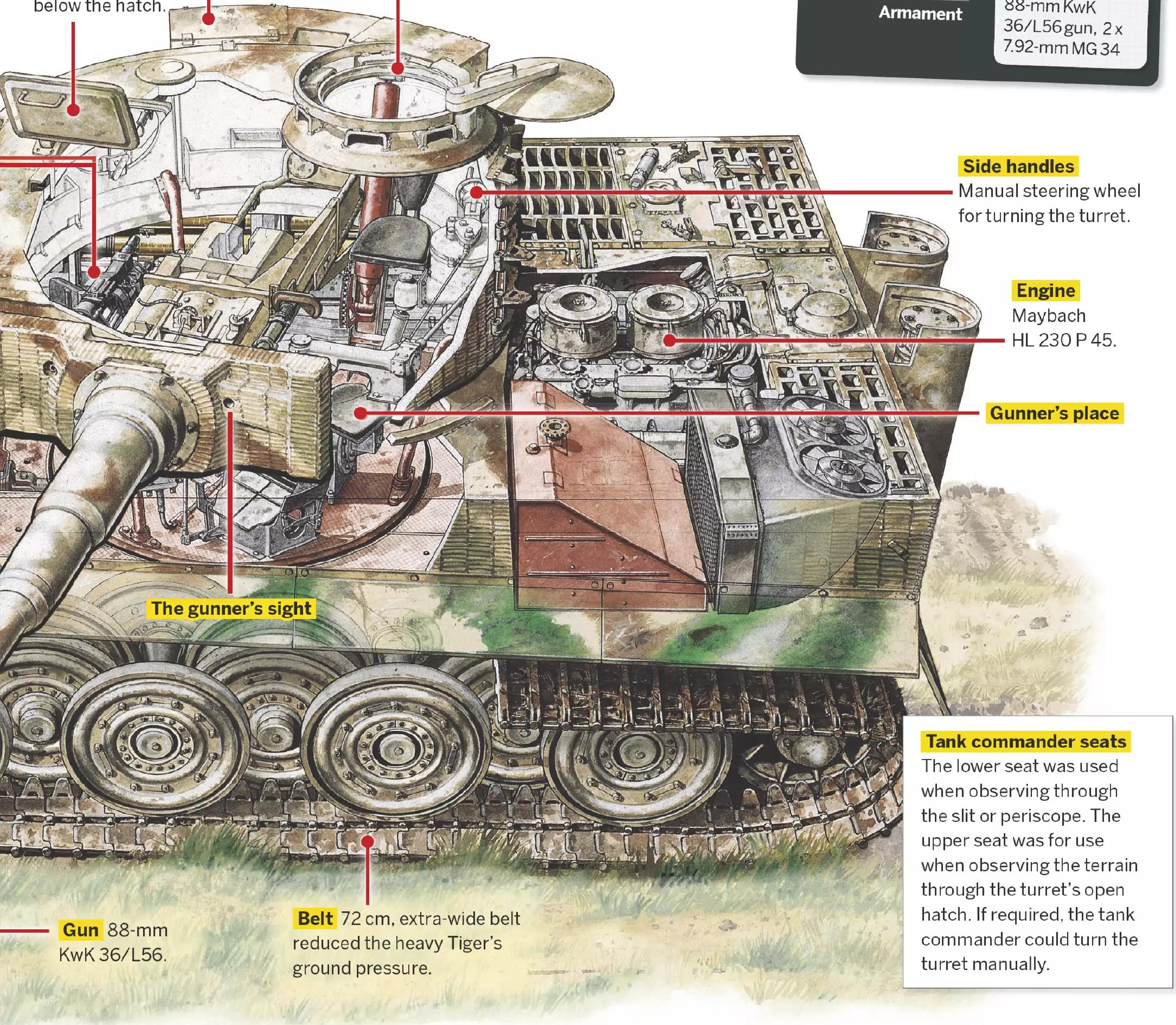
1941 after captured T-34 tanks had been studied. Nevertheless, the T-34 did strongly influence the design of the Tiger's successor - *Panzerkampfwagen Tiger Ausf. B* (Tiger II, aka the King Tiger) - which was first delivered in February 1944.

Tiger II **successor.**

BUNDESARCHIV: BILD 101I-721-0397-29/ WAGNER/CC-BY-SA 3.0

Panzer VI Tiger

Length wo/w gun	6.32 m/8.42 m
Width	3.70 m
Height	3.00 m
Weight	57 tonnes
Armour thickness **Turret (front/side)** **Hull (front/side)**	100–120/80 mm 100 / 60–80 mm
Trench crossing	2.5 m
Engine	112-cyl Maybach gasoline, 700 hp
Gearbox	Semi-automatic 8 fwd, 4 reverse
Speed	45 km/h
Horsepower/tonne	12.3
Ground pressure	0.74 kg/cm²
Range (calibre/length)	195/110 km
Armament	88-mm KwK 36/L56 gun, 2 x 7.92-mm MG 34


Ammunition loader His place was below the hatch.

Storage

Tank commander Observation turret with hatch and periscope. His place was under the turret.

Side handles Manual steering wheel for turning the turret.

Engine Maybach HL 230 P 45.

Gunner's place

The gunner's sight

Gun 88-mm KwK 36/L56.

Belt 72 cm, extra-wide belt reduced the heavy Tiger's ground pressure.

Tank commander seats The lower seat was used when observing through the slit or periscope. The upper seat was for use when observing the terrain through the turret's open hatch. If required, the tank commander could turn the turret manually.

technical hiccups along with the tank crews' lack of coordination was proving fatal. Henschel helped where it could. The company sent technicians to the front line to try to resolve the Tigers' mechanical problems and by the start of 1943, they had succeeded in eliminating the worst of the issues.

Despite the early problems, the crews appreciated the strength of the new tanks. Lieutenant Zabel's report following an attack at Sserernikowo in February 1943 reflects their sentiments.

"We counted 227 hits from anti-tank rifle rounds, 14 hits from 5.7 cm and 4.5 cm anti-tank guns, and 11 hits from 7.62 cm guns. The right track and suspension were heavily damaged. Several road wheels and their suspension arms were perforated. The idler wheel had worked itself out of its mount. In spite of all this damage, the Tiger still managed to cover an additional 60 kilometres on its own power. The hits had caused the failure of several welded joints to crack and caused the fuel tank to start leaking. The tracks had received several hits, but these didn't especially hinder the Tiger's mobility... In conclusion, it can be said that the armour on the Tiger can withstand the most intense punishment that the enemy can deliver. The crew can head into combat secure in the knowledge that they are surrounded by sufficient armour to keep out the most determined anti-tank round."

A FEW MONTHS EARLIER on 23rd November, 1942, the first elements of the 501st Heavy Panzer battalion arrived at Bizerte in Tunisia. Eventually, a total of 20 Tigers and 25 Panzer III would enter Field Marshal Erwin Rommel's Tiger Battalion with vehicles and crews being dispatched as soon as they were ready to be deployed in the fight to stop British and US troops moving on Tunisia.

Initially, though, only three Tigers and four Panzer III landed at the Bizerte docks, where they formed part of a battle group under the command of Major Hans-Georg Lueder of the 501st Heavy Panzer Battalion who was as impressed as Zabel with the Tiger's tough armour plating.

"The attack was carried forward against enemy tanks in olive groves 5 kilometres west of Djedeida. The field of view and the field of fire were very limited by the thick olive groves. Enemy tanks could only be fought at close range. Captain Deichmann, who left his Panzer to obtain a better view, was hit in the stomach by a rifle shot. The Tigers were hit by General Lee tanks firing at a range of 80 to 100 metres. This resulted in deep penetrations, but the last 10 mm of side armour held. This proved that the armour is excellent."

The German's problems with the Tigers didn't end with technical teething troubles and inadequate training. In April 1943, as more and more Tigers reached the front, command staff at various levels

"THE TIGER CAN WITHSTAND THE MOST INTENSE PUNISHMENT THAT THE ENEMY CAN DELIVER"

A Panzer VI Tiger crosses a watercourse on the Eastern Front in September 1943.

ATLANTIC PRESS/ULLSTEIN/IBL

demanded the new powerful weapon system be attached to their force.

General Heinz Guderian, Inspector General of Armoured Troops, was categorical in his rejection. He believed the Tigers should be used en masse to provide a focused attack against enemy tanks, not spread among infantry in a defensive support role. As the general put it, "You hit somebody with your fist and not with your fingers spread."

In May, Guderian stipulated that the units rolling off Henschel's production line should be organised into concentrated tank battalions, each comprising three companies with 14 Tigers each. Three additional Tigers would act as command vehicles and each battalion would also have mechanised reconnaissance units. The 503rd Heavy Panzer Battalion was the first to be brought up to strength under the new guidelines.

THE CREWS AND COMMANDERS assigned to the new Tigers were usually relatively experienced, but some soldiers came directly from three months of basic training. Instructors with experience at the front, drilled trainees so that they could perform their duties inside the tank. After that, the men were assigned to crews and taught how to work as a team. Finally, they would learn how to operate within the framework of a platoon, a company and a battalion.

Until the spring of 1943, training was handled in much the same way as it had been before the war. Then a *kurzausbildung* (short training) was introduced. The limited time available necessitated a re-evaluation of how training would be organised in future, including the need to continue practical training in the field.

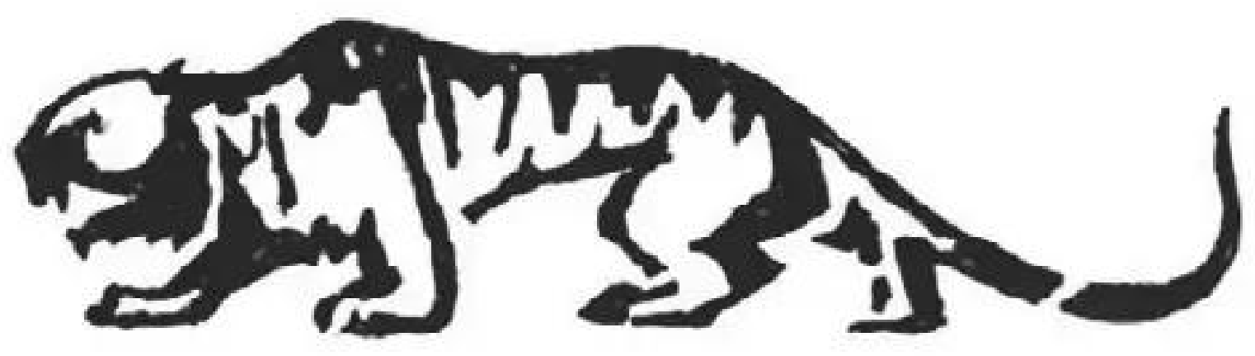
GUDERIAN WASN'T SATISFIED with the situation. In May 1943, the inspector general felt compelled to point out that training needed to focus on critical subjects and in areas where there was a genuine potential for improvement. For example, teaching soldiers night-time manoeuvres and how to operate in unpredictable, rugged terrain.

The need to find new methods of disseminating necessary knowledge to Tiger crews led to the production of the Tigerfibel (see page 72).

Each tank had a crew of five men: tank commander, gunner, ammunition loader, driver and radio/machine gun operator. The last two sat in the front of the carriage, while the other three occupied the turret.

The first Tigers were equipped with a turret with five viewing slots protected by armoured glass, but it had a big drawback: if the tank commander wanted to open the hatch to get a better view - a common occurrence in battle - he had to expose his entire upper body, putting him at great risk of being injured or killed. It was also difficult to see terrain immediately to the right of the tank because of the hatch door.

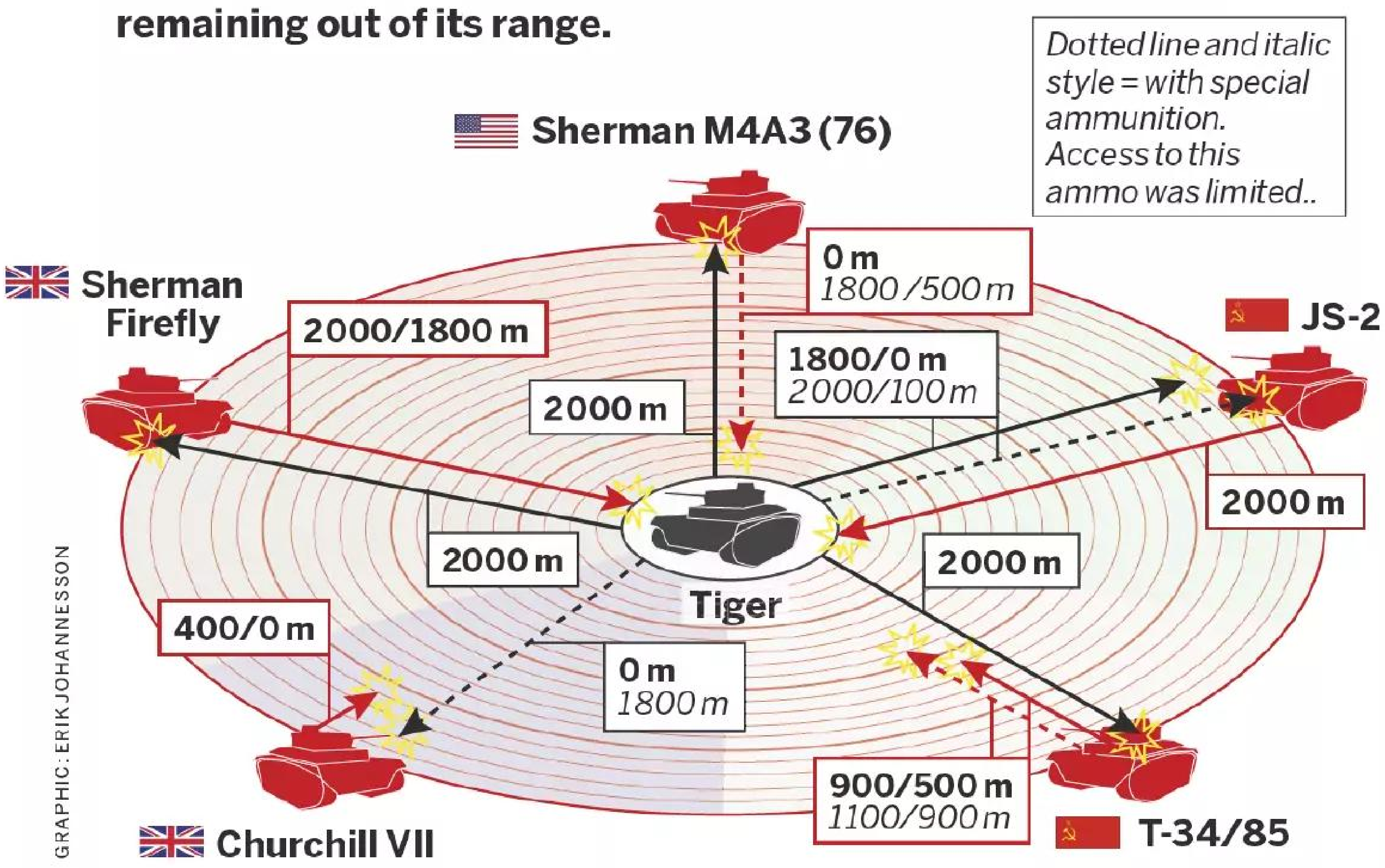
Later units were equipped with the same turret as the Panzer V Panther. This had seven periscopes, a mounting for an external machine gun and a hatch that could swing to the side when open. The tank commander was also responsible for using the ▶



The creeping tiger was the emblem of the 501st Heavy Panzer Division.

Tanks on the battlefield

Thanks to its powerful gun and solid armour, the Tiger was a very effective tank compared to its predecessors. It was capable of hitting an enemy tank while simultaneously remaining out of its range.

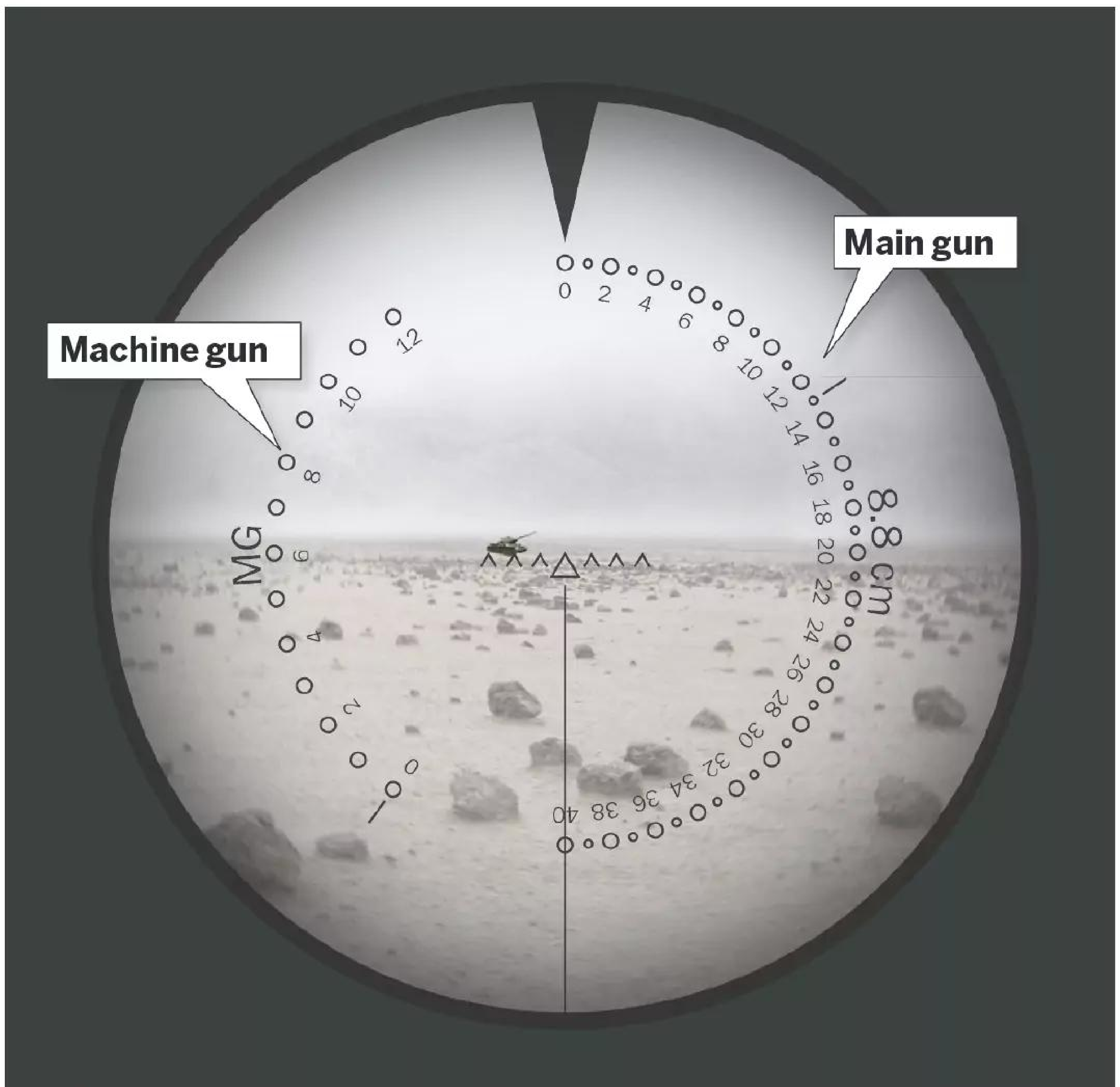


GRAPHIC: ERIK JOHANNESSON

The Tiger and its enemies

Tanks *Panzer VI Tiger and its armoured competitors*	**Armament** *"L" indicates barrel length relative to calibre*	**Frontal armour (mm) Turret / Hull** **sloping = better shield*
Panzer VI Tiger	**88-mm L/56**	**100–120/100**
Sherman M4A3 (76)	76-mm L/55	89/64*
Sherman Firefly	76.2-mm L/55	76–89/51
Churchill VII	75-mm L/40	152/139–152
T-34/85	85-mm L/53	45–90/47*
JS-2	122-mm L/48	100/90–120*

★ The diagram shows the Tiger's approximate firing range. The distances are measured between the tanks' fronts. Where the hull's thickness varies, two numbers are given (turret/hull). In fact, the range achieved under battle conditions was often significantly shorter. It was influenced by the weapon's performance, sight optics, armour quality and the type of ammunition.



Panzer VI Tiger was equipped with telescopic view TZF9b. It had 2.5-fold magnification (later five-fold magnification) and a 25-degree field of vision. There were two scales, one for the machine gun and one for the main gun.

18 damaged Tigers were refitted as Sturmmörser Tigers in 1944. These tanks had a 380-mm rocket launcher designed to crack the toughest bunkers.

The crew surveys the damaged hull of a Tiger after taking a hit from an enemy tank.

rangefinder and periscope binoculars, if there were any, as well as firing the smoke grenade launchers.

The tank's gun sight had different scales for the main gun and machine gun and was extremely accurate. The double-lens, binocular system was replaced by a monocular sight in spring 1944. The gunner was only able to look in a forward direction and had a limited field of vision. The turret could be swung around, either manually or hydraulically, though the efficacy of the hydraulics was dependent on the engine's running speed. The gun's height was set manually. The gunner fired the parallel-connected machine gun using a foot pedal, while the main gun was fired electrically with a trigger mounted on the height adjustment lever. In most cases, the gun was only fired when the tank was stationary, otherwise it was too inaccurate.

The ammunition loader had to keep track of the 92 shells that were stored inside the hull and load the main gun along with the parallel-connected machine gun. Most of the time the main gun's ammo consisted of armour-piercing, ballistic cap (PzGr. 39) and high explosive anti-tank (Hl. Gr. 39) shells. Other options included incendiary shrapnel (Sprgr. Patr. L/4.5) and the tungsten-core (pzgr 40) shells. The ammunition loader was also responsible for checking that the main gun and machine gun were ready to fire, and that the height and lateral controls were set correctly. When a close combat weapon was introduced in the spring of 1944, it was the ammunition loader who used it to fire short-range shells at nearby enemies.

The driver sat on the left in the front of the hull. He could see straight ahead through an armoured-glass slit in the hull and obliquely forward and left through a periscope mounted in the door above his head. The driver was responsible for keeping the main cabin of the tank in a combat-ready state. The rest of the crew also helped with this job.

The radio operator, who also fired the machine gun when required, sat to the right of the driver. His main task was to take care of the tank's communication equipment, including the internal comm system that was mounted in the hull. He was able to see straight ahead through the machine gun sight and through a periscope that was mounted in the hatch over his head.

MOST TIGER TANKS were attached to standalone heavy panzer battalions under *Wehrmacht* (German Army) control or were deployed within the Waffen-SS. The Wehrmacht had ten battalions and the Waffen-SS four. In addition, three other Waffen-SS divisions and the army's Großdeutschland division had Tiger tanks in heavy panzer companies (Großdeutschland's company was later converted into a full battalion).

Some Tiger formations were equipped with miniature radio-controlled tracked vehicles like the Goliath that were designed to carry explosive charges under enemy tanks. As the war progressed, the original Tiger was superseded by the Tiger II and by the final phase of the war, the first incarnation was sprinkled almost randomly among Hitler's remaining forces.

Despite the fact that the Tiger was in production for two years, the changes made to the model were never extensive enough to warrant new version names (unlike the Panzer IV whose various iterations covered the alphabet from A to J during its production run from 1937-45.) That doesn't mean that the Tiger didn't undergo plenty of revisions, though. Some of the modifications were due to deficiencies only identified once the Tigers were deployed on the battlefield, while others were the result of technical advances or made as a way to save money. Some examples:

- In May 1943, the engine power increased from 650 to 700 horsepower.
- Five launchers for anti-personnel devices known as S-mines were added in 1943. The launchers were located around the tank's hull and could be fired from inside. Once triggered, one or more mines were launched a short distance from the Tiger and immediately detonated.
- An improved hatch with a periscope as opposed to an armoured glass slit in the turret was introduced in February 1944.
- In March 1944, a *nahverteidigungswaffe* (a near-defence weapon) replaced the s-mine launcher in the turret roof behind the ammunition loader's hatch. At the same time the turret roof's plating was reinforced, taking it from 25-mm to 40-mm thick.

Unlike previous Panzer models, the number of varieties based on the Tiger I was quite limited. Two different command tanks were produced – one for company commanders and the other for battalion bosses. These had better radio equipment but couldn't store as much ammunition. Easy to identify thanks to their extra radio antennas, Henschel delivered 89 of these command tanks. From August to December 1944, 18 damaged Tigers were converted to *Sturmmörser* (Storm Mortar) tigers. These tanks were refitted with a huge, stubby 380mm rocket launcher that was designed to crack the toughest bunkers.

The German tradition of constantly improving tanks that were already in production continued with the Tiger. It was the Wehrmacht way: the German army was always striving for technical excellence rather than finding solutions that would facilitate mass production. Tiger production reached its zenith in the first half of 1944 and in June, 104 tanks were delivered to the front line. It was a record number for the Germans, but a drop in the ocean compared to Soviet and US manufacturing figures.

“THERE WERE NEVER ENOUGH TANKS FOR THEM TO MAKE ANYTHING OTHER THAN A LIMITED CONTRIBUTION”

HOW GOOD WAS THE TIGER? That's a question that still prompts much discussion. German engineering scaled new heights and, in many ways, the Tiger may be viewed as a technical masterpiece. From a pragmatic viewpoint, though, there were plenty of drawbacks: it cost around two-and-a-half times as much as a Panzer IV and almost twice as much as a Panther, which gives an indication of how complicated it was to build. As a result, relatively few Tigers were ever produced.

If we examine the tank itself, we can see that the armour was excellent, the weapon capability strong and the reliability was high – providing that the crew had time to undertake the somewhat extensive maintenance work required to keep the tank operating. If the ammunition, fuel and repair services were functioning, the Tiger was an effective machine.

Tigers controlled the battlefields along the Eastern Front for almost two years until summer 1944, but their success was always local. There were never enough tanks for them to make anything other than a limited contribution to the overall war. The Soviets were soon creating better tanks and anti-tank guns in ever greater numbers, and ultimately that proved decisive.

In North Africa, Italy and later on the Western Front, it was a similar story. Tiger formations often made progress – but it was only ever local and often short-lived. The Allies usually had air superiority, and their bombers attacked not only the tanks, but also vital supply and repair lines. Without fuel, many Tigers had to be destroyed to prevent them being captured by enemy forces. Moving vehicles in the day was almost impossible, while night-time manoeuvres were problematic and slow.

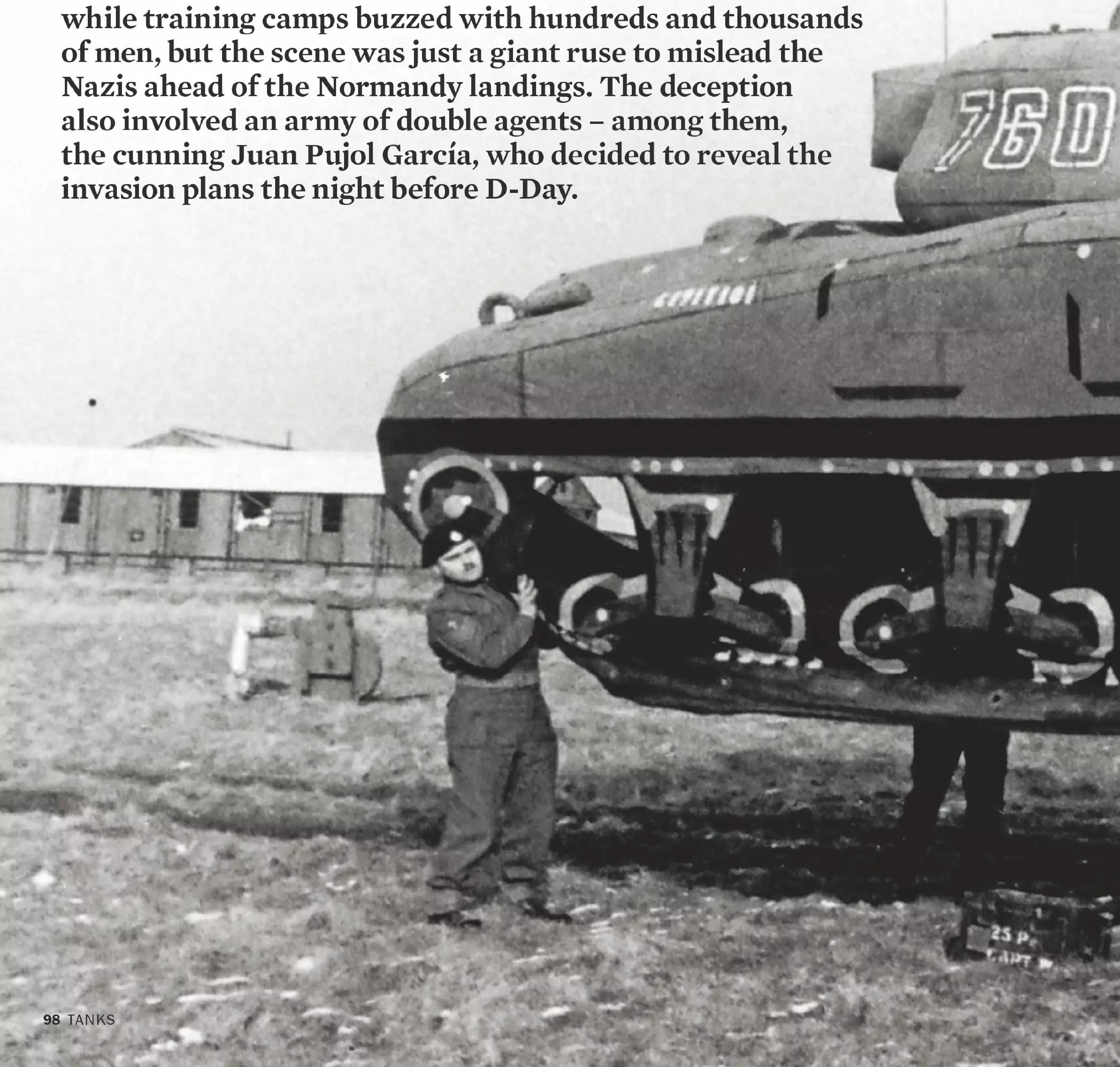
The Tiger as a weapon system stood up well throughout the war, but it's not enough to win a single fight or even an individual battle if you don't have the resources to win the war. ✪

Harald Sonesson is a reserve tank officer.

Further reading: Tigers I and II and Their Variants (2007) by W Spielberger
★ **Tigers in Combat (1 & 2)** (2004/2005) by W Schneider
★ **Tigers in the Mud** (2012) by O Carius

THE GREAT

When German spy planes flew over southern England in the spring of 1944, the pilots witnessed a terrifying sight. Where before the landscape had lain deserted, the Allies were now building a vast army. Tanks and planes were ready to attack, while training camps buzzed with hundreds and thousands of men, but the scene was just a giant ruse to mislead the Nazis ahead of the Normandy landings. The deception also involved an army of double agents – among them, the cunning Juan Pujol García, who decided to reveal the invasion plans the night before D-Day.

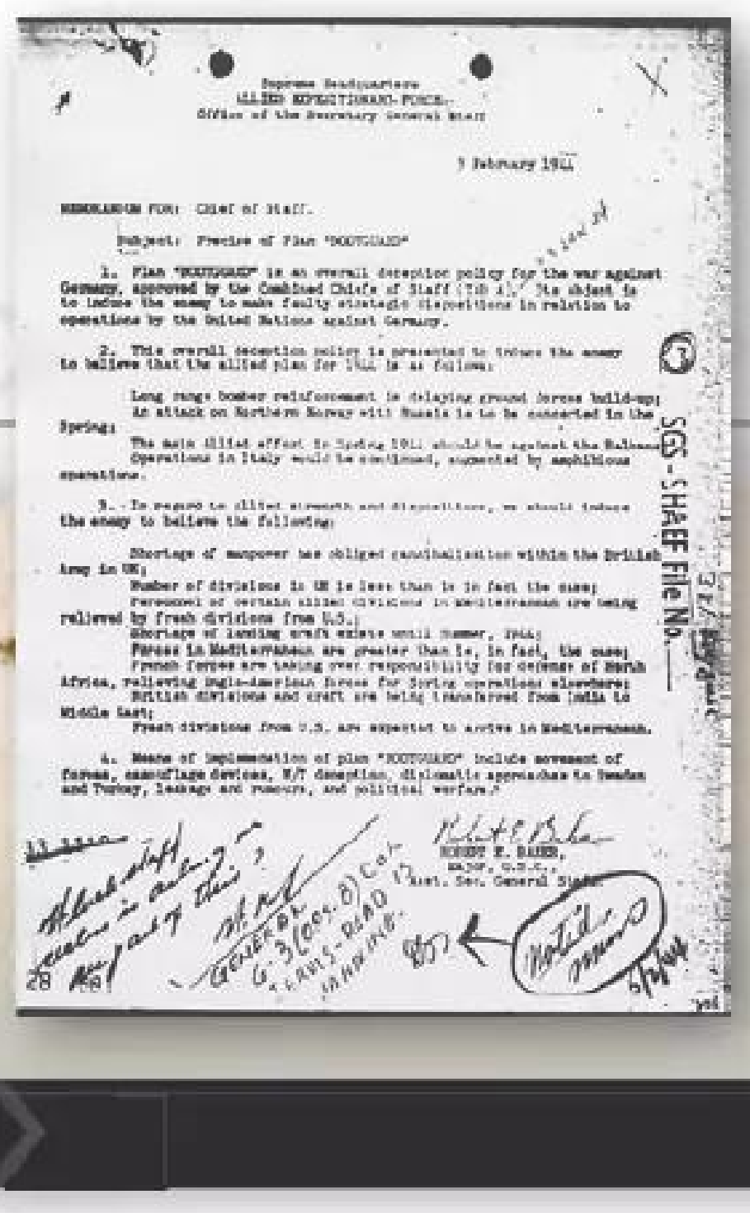


DECEPTION

1941-1944

1941 Juan Pujol becomes a German agent code named Alaric.

1942 The British hire Pujol as the double agent Garbo.

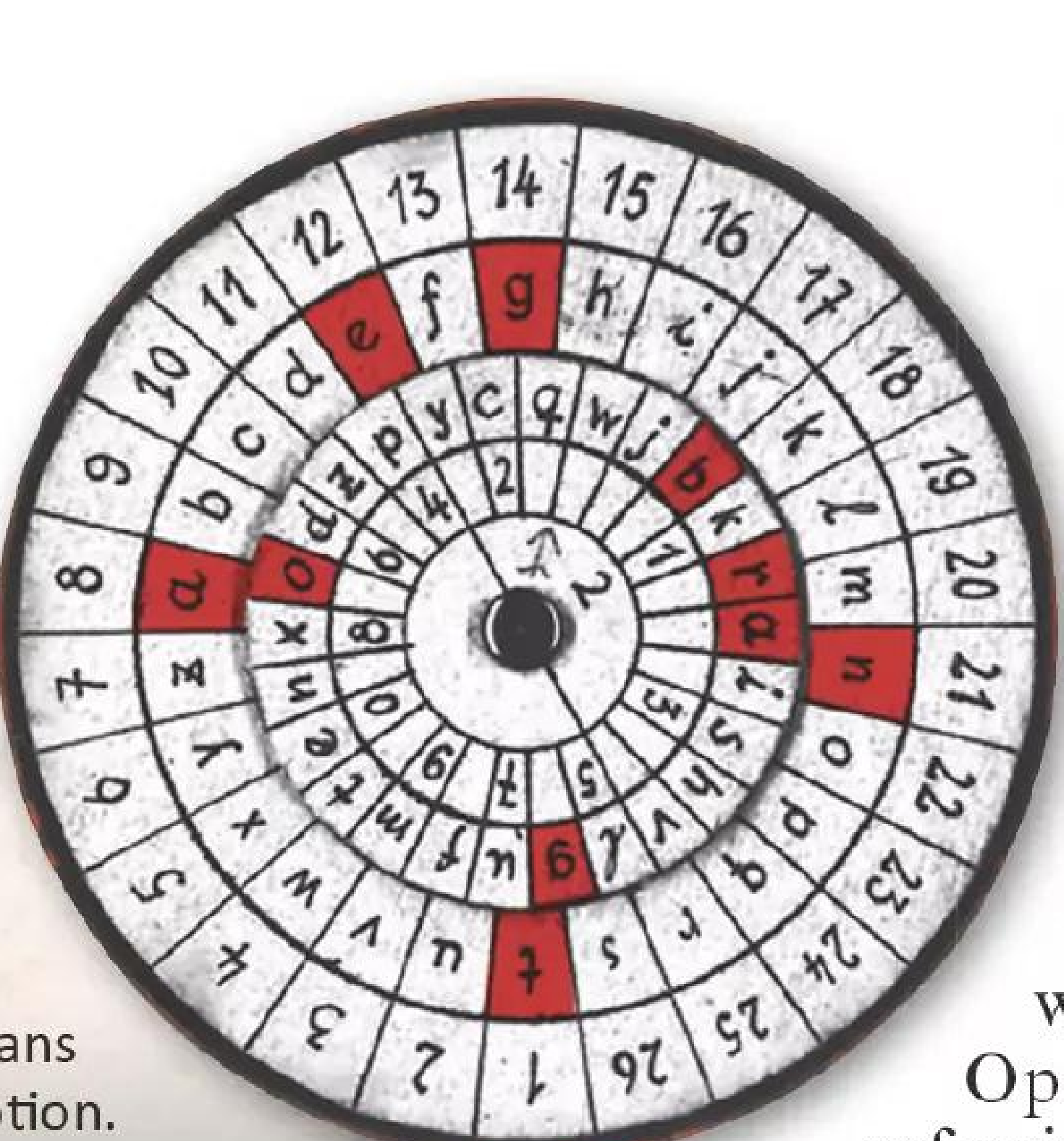


1943 Allies plan Operations Bodyguard and Fortitude.

1944 Fake tanks, aircraft carriers and planes are put in place.

1944 Pujol sends false intelligence to the Germans using encryption.

1941 1942 1943 1944



Shortly before midnight on 5th June, 1944, a small group moved through London's darkened streets. They stopped in front of an unassuming house on Crespigny Road on the outskirts of the city. At the front stood a slender figure whose face was framed by a large pair of glasses. The man was Juan Pujol García, Britain's top double agent; he was codenamed Garbo – after the actress Greta Garbo – because of his ability to assume different roles. In his most important performance, Pujol played the part of a German secret agent codenamed Alaric, one of Hitler's most trusted informants.

Behind Pujol, as he entered the townhouse that June night, was Tommy Argyll Robertson, known simply as TAR, head of Britain's counter-espionage unit MI5. Behind TAR came Tomás 'Tommy' Harris, Pujol's MI5 handler, followed by Lieutenant-Colonel Roger Fleetwood-Hesketh. Bringing up the rear was Sergeant Charles Haines, a former bank clerk, now serving as Pujol's wireless operator. The five men were dressed in civilian clothing and had come from an exquisite dinner at Harris's home, where they had sampled a Château Ausone 1934 from his well-stocked wine cellar. Now that they were inside the house on Crespigny Road, the group began to feel a strange mixture of excitement and nervousness. They were about to carry out a mission that on the surface looked like the ultimate betrayal of their allies; the group was going to warn the Germans of the impending invasion of Normandy, which was scheduled for dawn the following morning, on 6th June, 1944.

Eavesdropping on German radio communication revealed that the Nazis had been fooled by the Allies' hoax.

General George S Patton commanded FUSAG, whose sole purpose was to mislead the Germans.

TRUTH MUST BE GUARDED BY LIES

Garbo and his colleagues didn't serve in uniform on the front line. Nor did they orchestrate the great battles that would push back German military power. Yet, with 32-year-old Juan Pujol at the forefront, they played a prominent role in the battle that would determine the future of Europe: D-Day. The men's work was, in fact, paramount to the great deception that would dupe the Germans into believing that the Allies would make their assault anywhere other than where they planned to strike: the north coast of Normandy.

It was impossible that Hitler wouldn't hear that the Allies' three principal leaders, Winston Churchill, Joseph Stalin and Franklin D Roosevelt, planned an invasion to open a new Western Front. He also knew that they were forming concrete plans throughout 1943 and 1944. What the Führer couldn't be sure about, though, was where and when the invasion would take place.

If the Allies could convince the Nazis that they were attempting to land somewhere other than Normandy's north coast, the Germans wouldn't reinforce that area, leaving it more vulnerable to attack. The element of surprise was one of the key elements of the D-Day plan. The Allies' large-scale attempt at deception was codenamed Operation Bodyguard, referring to Churchill's words at the Tehran Conference in 1943.

"In wartime, truth is so precious that she should always be attended by a bodyguard of lies."

The operation, which featured false intelligence, double agents, fabricated armies, fake tanks and choreographed radio reports, was intended to concentrate Hitler's attention elsewhere.

As part of Operation Bodyguard, the Allies launched a number of specific sub-operations – including Operation Fortitude South and Operation Fortitude North.

GHOST ARMY IN ACTION

The mission of Operation Fortitude South was to create the illusion of a fearsome US Army Group, referred to as the First United States Army Group or simply FUSAG, who were stationed in south-east England under the command of the acclaimed US general George S Patton. From there, the army would invade France via the port of Calais. General Patton arrived in Britain to lead this army of phantom soldiers, which if real, would have boosted Allied numbers by at least 70 percent. Using subterfuge and chicanery, the FUSAG gave the impression that it was an army of a million soldiers.

The ghost army was established primarily by sending out fake radio messages, which were intercepted by German wireless operators who believed they were listening in to genuine enemy communications. FUSAG staged entire radio dramas, complete with the sound of humming trucks, hard-working soldiers and everyday life in the camp. To complete the illusion, FUSAG also issued reports detailing new recruits arriving from the US. The wireless operators appointed fictitious leaders, read touching letters from non-existent soldiers to wives and girlfriends back home and frequently reported important American football matches and baseball games.

But the Germans were not just conned via the airwaves. *Abwehr* (German military intelligence service) regularly sent reconnaissance planes to Britain to spy from the air. The pilots, looking down over south-east England during Operation Bodyguard were treated to a credible spectacle of a vast military encampment. On the trampled fields, camouflage-clad FUSAG soldiers set up one tent after another for thousands and thousands of non-existent troops.

Had the pilots been closer, they would also have heard the sound of orders flying ►

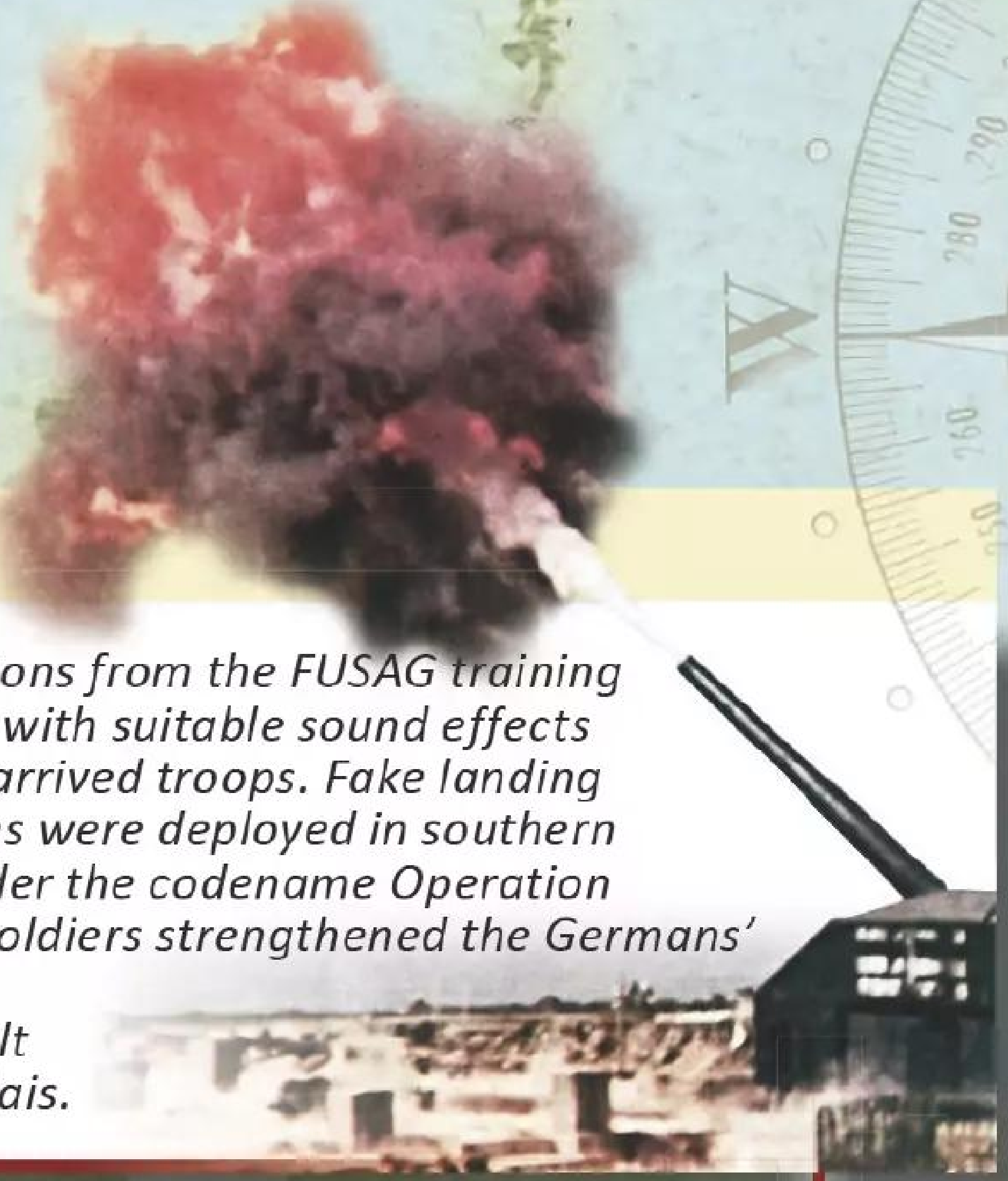
HITLER WAS DECEIVED

In the lead up to D-Day, the Allies misled the Germans with false invasion plans. The goal was to fool Hitler into moving his forces, leaving Normandy's north coast relatively unprotected.

WEST COAST OF NORWAY

■ *In northern England and Scotland, the troops of Operation Fortitude North created the illusion that a giant army was preparing to invade Norway. Fake radio communications about the army's new recruits helped to set the scene.*

CALAIS



■ *Radio communications from the FUSAG training camp came complete with suitable sound effects and reports of newly arrived troops. Fake landing craft, tanks and planes were deployed in southern England. Working under the codename Operation Fortitude South, the soldiers strengthened the Germans' suspicions about the likelihood of an assault being launched at Calais.*

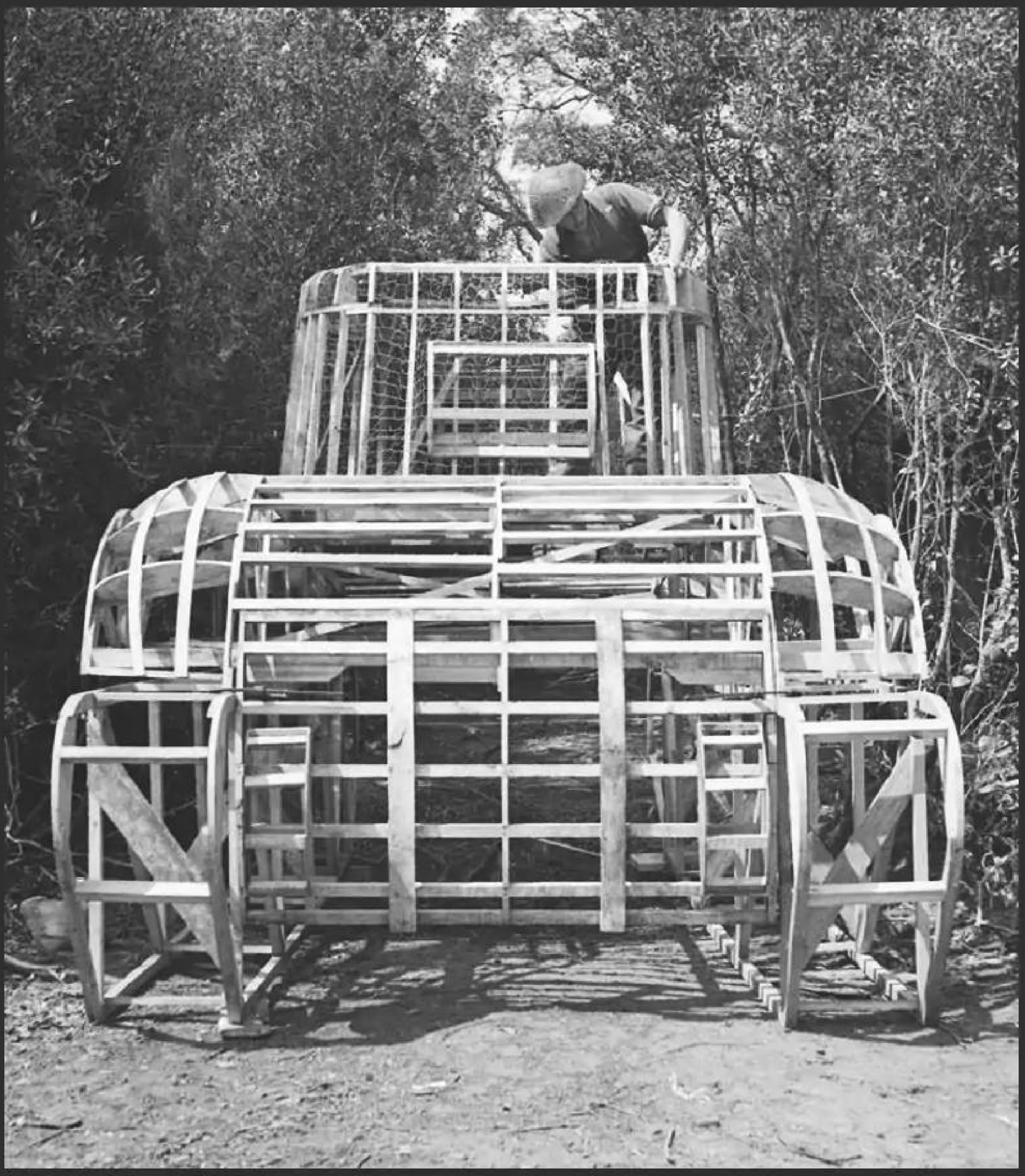
WEST JUTLAND

■ *Hitler sent reinforcements to the West Coast of Jutland, but soldiers there waited in vain for an invasion. The Germans were deceived by Operation Fortitude and Bodyguard, which also pretended that the Allies would land in Denmark.*

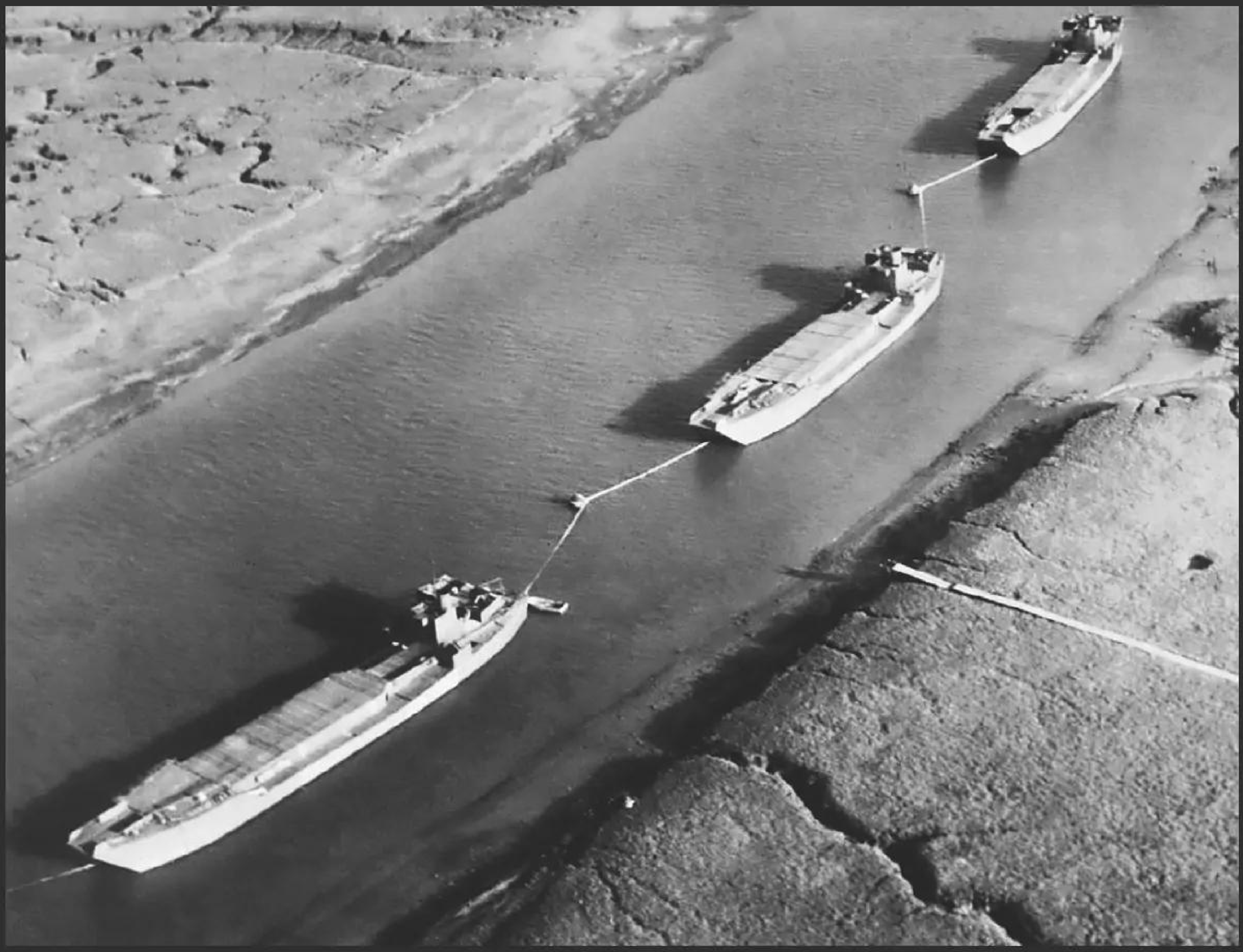
BALKANS

■ *Operation Zeppelin fooled the Germans into preparing additional defences in the Balkans and Greece against a suggested Allied invasion. Like Operation Fortitude, the deception employed fake intelligence and radio reports.*

In the spring of 1944, Allied soldiers trained in Britain – some of the exercises were real preparations, but some were part of the hoax.



TANKS: the Allies ordered soldiers in the fake armies, such as FUSAG, to build wooden tanks and cover them with canvas. From the air they looked like real tanks.



LANDING CRAFT: using steel rods and empty oil drums for buoyancy, the Allies designed gigantic fake landing craft tanks. They were intended to create the illusion that the Allies had 400 new landing craft ready for an amphibious assault on France.

through the air and smelled of cooking in the lively mobile field kitchens. The scene was choreographed with field hospitals, weapons depots and enough hangars to accommodate at least two squadrons of RAF Supermarine Spitfire aircraft.

FUSAG also drove around in fake tanks, jeeps and other military vehicles to add to the illusion. Soldiers built wooden vehicles covered with khaki canvas and blew up inflatable rubber tanks too. From the air, the spy planes watched in awe as the military ordnance grew day by day. Some of the counterfeit vehicles did not last long, however – curious cows occasionally punctured the inflatable tanks by standing on them.

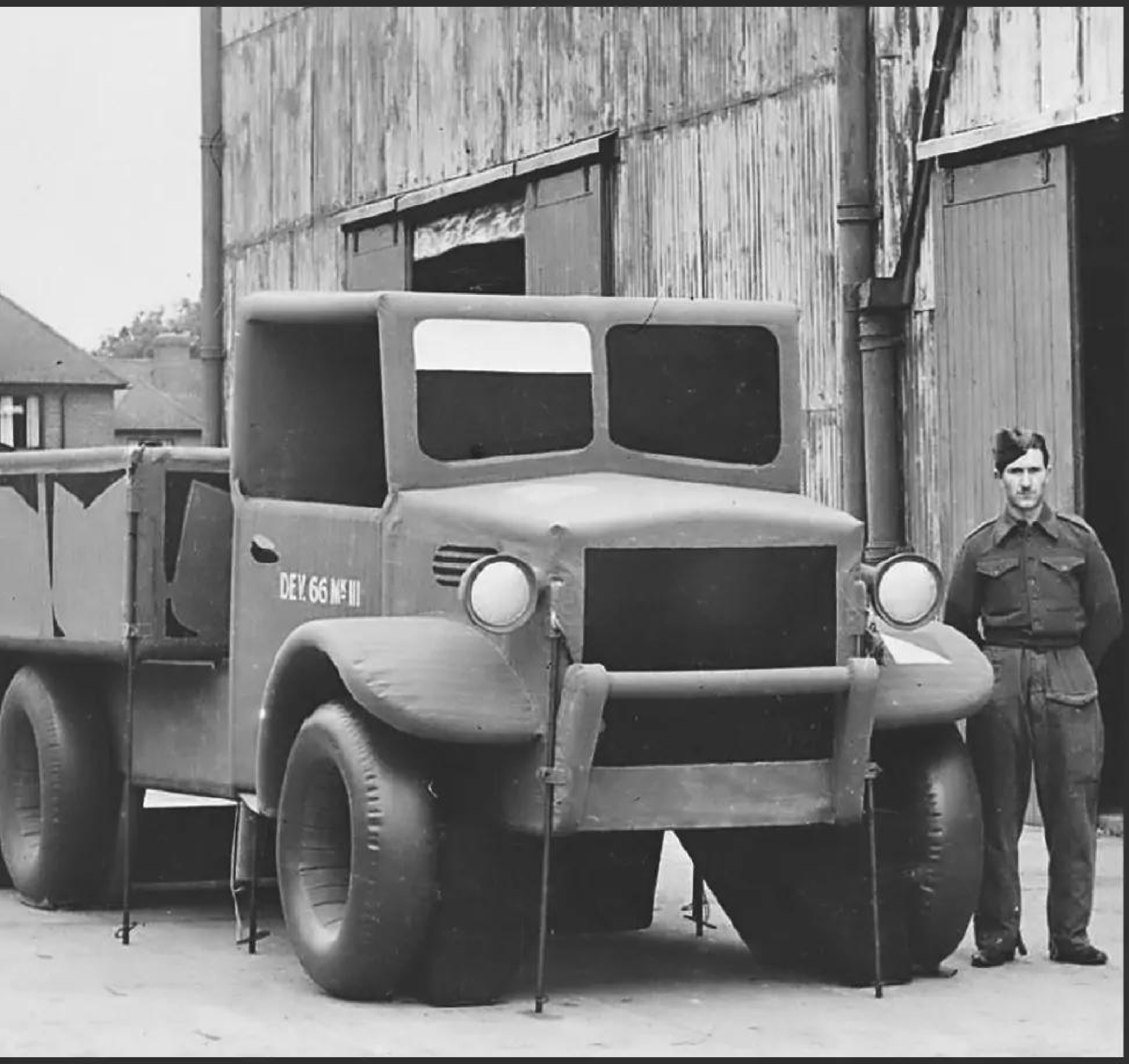
To complete the staging, the soldiers often repositioned the false tanks and jeeps. Under the cover of darkness, they dragged the vehicles from one place to another, then used tools to create realistic traces of tyres and tracks along the paths taken. The trails could be seen from the air in daylight.

FAKE LANDING CRAFT

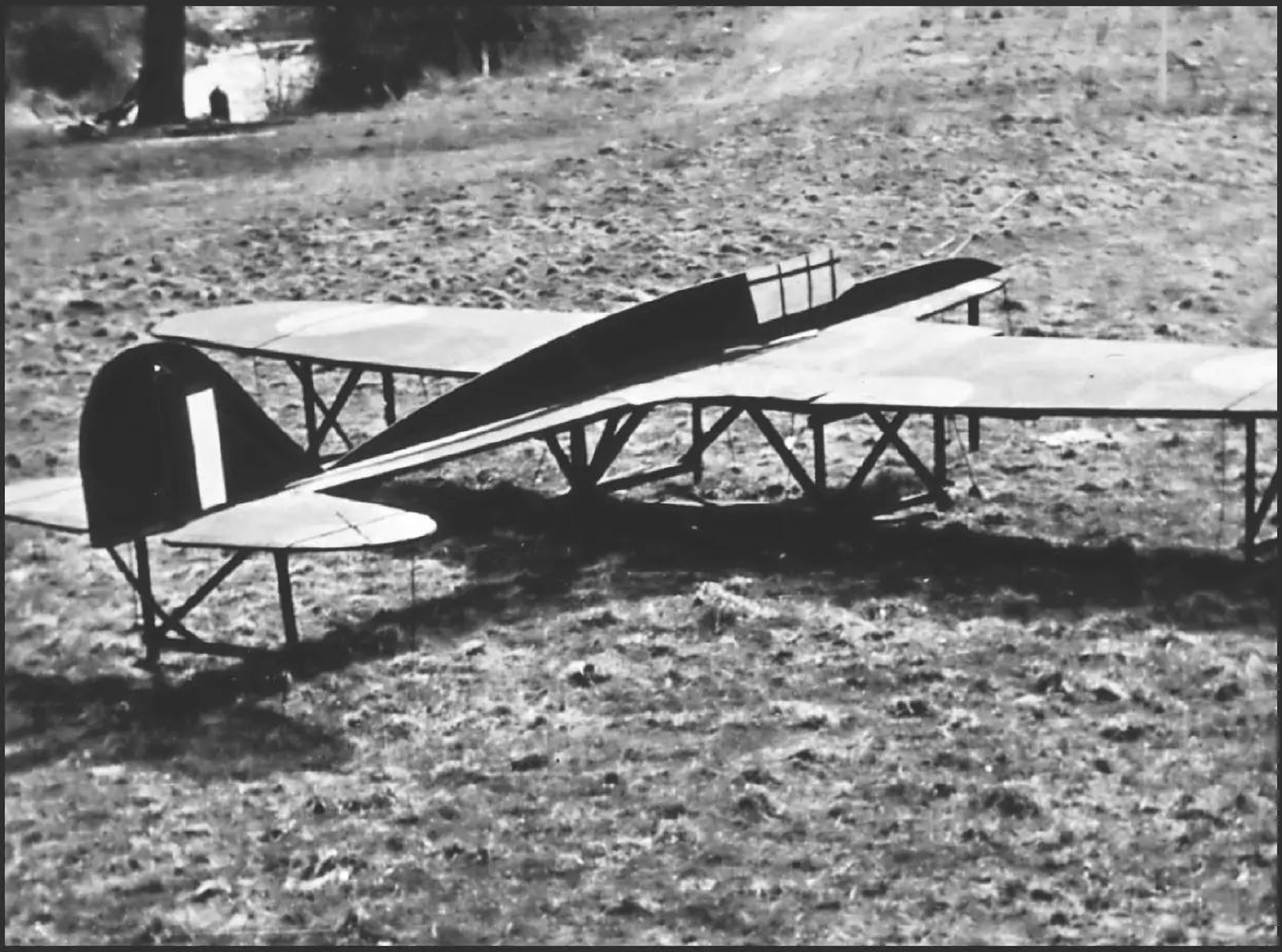
The fun and games continued at sea. With the help of the British film industry, the Allies created 400 huge fake landing craft tanks (LCTs),

> “Under the cover of darkness, they dragged the vehicles from one place to another”

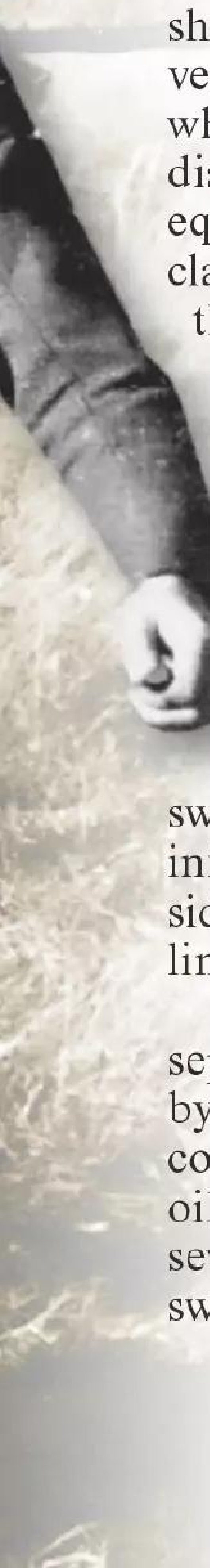
When the air was released from an inflatable tank, two soldiers could carry it easily.



BUSTLE: fake military vehicles, lively field kitchens, along with the noise from the military camp and wireless reports of recruits gave the impression of a huge army.



AIRCRAFT: the brains behind the hoax also ensured that German spies would discover a frighteningly large air force waiting on the southern shores of England. The planes were in fact built of wood and would never take off.



which could land tanks and other heavy weapons during an amphibious assault. One type of fake LCT was called bigbob and was 50 metres long and nine metres wide, but weighed just under five tonnes. The vessels were constructed from steel tubes and heavy canvas and were held up by floating steel drums. It took 30 men about six hours to assemble a bigbob, which consisted of over 1,000 different components. The work was carried out in the dead of night.

350 carrier pigeons flew as 'double agents' carrying false intelligence to the Germans.

The finished LCT was equipped with small wheels, so the soldiers could move it over short, flat stretches to reach the vessel's mooring. Lieutenant Hugh Clark, who headed the shipbuilding, quickly discovered that simulated warfare could be equally as exhausting as the real thing, claiming that the crews often worked half the night submerged in water.

Bigbob had a co-conspirator: the inflatable rubber landing craft assault carrier known as wetbob. When wetbob was deflated, it was just two metres long and less than one metre wide. Inflated it measured 36 metres, but weighed no more than a well-built man: 90 kg. This made the vessel extremely vulnerable to the winds that swept along the coastline. To prevent the inflatable carriers from blowing on to their sides, they were fixed in place with mooring lines and sea anchors.

Near the town of Dover, which was only separated from the French port of Calais by a 50 kilometre stretch of sea, the Allies completed the picture by building a dummy oil storage facility from wooden boards and sewer pipes. At night, German spy planes swept floodlights across the site looking for signs that the tankers were loaded. Below, hard-working FUSAG soldiers lit small, sooty furnaces that covered the fake depot with dirty smoke, adding another layer of realism to the scene.

Nothing was left to chance. Not even when the Nazi's began firing at the fake facility using long-range artillery on the French coast. In response, hired pyrotechnicians, faked 'fire damage' using sodium flares and mobile smoke machines, helping to convince German pilots that their artillery had hit the target.

AN ATTACK ON NORWAY

In Scotland and northern England, the units of Operation Fortitude North (OFN) worked just as hard to deceive the Germans. Like their US counterparts in the south, British OFN troops attempted to inflate their numbers and take on the aspect of a mighty army that was ready to occupy the west coast of Norway. Their aim was to fool the German army into retaining far more troops along the coasts of Denmark, Norway and Finland than were actually needed.

As in the south, a group of officers was tasked with broadcasting the sounds of a gathering army, specifically a 350,000-man strong British Fourth Army. The radio subterfuge was codenamed Operation Skye. To create realistic sound effects required a certain number of men, vehicles and planes. The force in the north therefore consisted of a smaller group of genuine soldiers who played the role of a more powerful army as best they could.

The Fourth Army also built wooden aircraft hangers and deployed inflatable tanks, which could not be distinguished from the real thing from the air. The Germans took the bait hook, line and sinker. Due to Operation Fortitude North, 13 of Hitler's army divisions, 15,000 men in total, were ordered to remain at their posts in Norway, Denmark and Finland.

AGENTS BECAME DOUBLE AGENTS

Despite the British and US troops' elaborate efforts to fabricate two gigantic ▶

MEANWHILE IN THE MEDITERRANEAN

OPERATION MINCEMEAT: THE GERMANS WERE FOOLED

In 1943, the British planted false documents on a corpse and threw it in the Mediterranean, where the Germans would find it. The body was supposed to trick the Germans into believing that the Allies would invade Greece. After finding a family willing to donate a body to the rather insensitively named Operation Mincemeat, the British dressed the body in uniform and equipped it with false identity papers and personal belongings. The Germans swallowed Operation Mincemeat whole,leaving the Allies free to invade Sicily and southern Italy.

> “15,000 men were ordered to remain at their posts in Norway, Denmark and Finland”

German soldiers waited in vain along the Norwegian coast for an invasion that never came thanks to the efforts of the Allied soldiers in Scotland and northern England who took part in Operation Fortitude North.

▶ armies, Operation Bodyguard would almost certainly have been less effective if it weren’t for the help of an intricate network of double agents. Even before the Allies decided to create an involved hoax to conceal their true D-Day plans, the British intelligence service had already established a web of double agents to confuse and mislead Hitler. Many of the double agents had originally been Nazi spies before they were captured and ‘persuaded’ to work for the enemy instead. Such agents, therefore, remained in contact with Abwehr, who continued to believe that they had reliable men in place with the Allies. By maintaining the illusion of a well-functioning corps of Nazi spies, the Allies avoided more Germans spies being sent to Britain. The double-agent operation was run by MI5 and was called Double-Cross or just XX. After the end of the war, it became clear that around 50 German agents had worked secret for Double-Cross.

> **Juan Pujol** underwent two weeks of interrogation before the British intelligence service MI5 dared to hire him.

The chicken farmer who deceived Hitler

The agents were controlled by intelligence chief Thomas Argyll Robertson, TAR. After years of experience, he knew that to get the German’s to take the bait his double agents had to feed the Germans information that matched their expectations. If Hitler feared that a giant British army stood ready in south-east England, Double-Cross’ job was to confirm those fears.

The Catalonian Juan Pujol was one of the main reasons that the Nazis bought into the illusion that they had a functioning network of German spies on British soil. The cunning agent had previously worked as a cavalry rider during six months of compulsory military service, then as a chicken farmer and finally as a manager of a one-star hotel in Madrid – all without much success. His dream of using his wits to combat the Nazis was born when he saw the fascists ravaging his homeland during the Spanish Civil War in 1936-39.

“I wanted to start a personal war with Hitler. And I wanted to fight with my imagination”, the agent explained later.

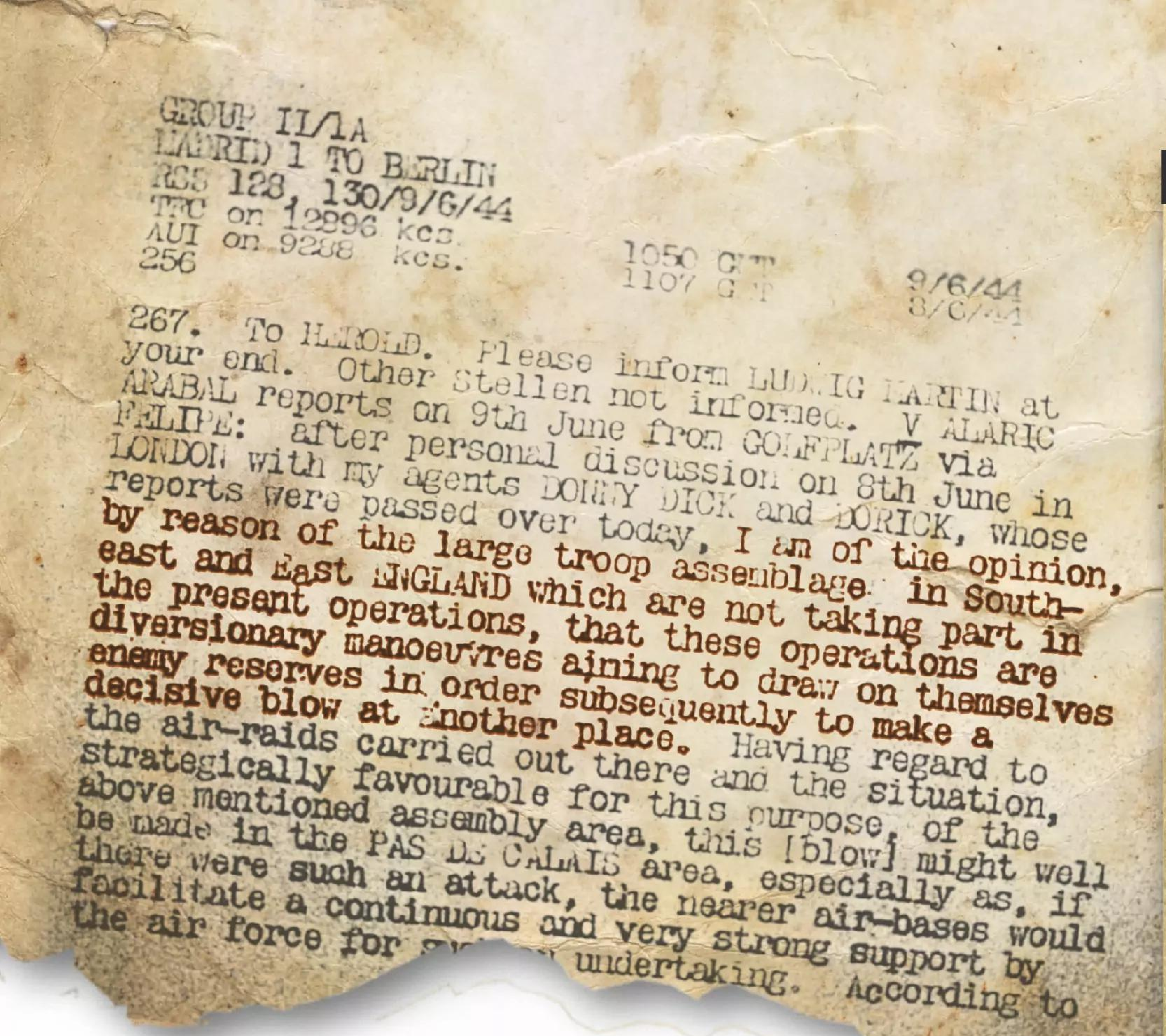
Pujol was so determined to be selected as an agent, that he repeatedly contacted the British intelligence service to offer his services. Despite his offer being refused three times, Pujol did not give up. Instead, he contacted the German secret service, who agreed to test him. With his acting abilities, he managed to convince the Germans that he was feeding them vital information from London. In fact, he was living in Lisbon and simply making up fictional accounts of Allied activities using a basic guidebook that described London and England.

Abwehr was satisfied with its talented new agent, however, and codenamed him Alaric. When the Allies got wind that a new German spy was operating in England, they immediately feared that he would expose the Double-Cross operation and thus endanger Operation Bodyguard. At the same time, however, they wondered why the agent passed on so many inaccurate, incorrect or implausible reports. For example, Alaric boasted of having met a snitch in Glasgow that would “do anything for a litre of wine”. Fortunately, the Germans understood no more about the

KEY MOMENTS

Hitler rejects genuine intelligence

Days after D-Day, German units found an abandoned British landing craft on one of the beaches in Normandy. The vessel hid top-secret documents with short and detailed plans for the invasion of Normandy. Hitler, however, was still convinced that the Allies would attack Calais and believed that the documents were planted to fool the Germans and so he rejected them.



GROUP II/1A
MADRID 1 TO BERLIN
RSS 128, 130/9/6/44
TRC on 12896 kcs.
AUI on 9288 kcs.
256

1050 GMT
1107 GMT

9/6/44
8/6/44

267. To HAROLD. Please inform LUDWIG MARTIN at your end. Other Stellen not informed. V ALARIC ARABAL reports on 9th June from GOLFPLATZ via FELIPE: after personal discussion on 8th June in LONDON with my agents DONNY DICK and DORICK, whose reports were passed over today, I am of the opinion, by reason of the large troop assemblage in South-east and East ENGLAND which are not taking part in the present operations, that these operations are diversionary manoeuvres aiming to draw on themselves enemy reserves in order subsequently to make a decisive blow at another place. Having regard to the air-raids carried out there and the situation, strategically favourable for this purpose, of the above mentioned assembly area, this [blow] might well be made in the PAS DE CALAIS area, especially as, if there were such an attack, the nearer air-bases would facilitate a continuous and very strong support by the air force for [illegible] undertaking. According to

Even after D-Day, with a single telegram double agent Juan Pujol succeeded in convincing the Germans that the attack was merely a cover for an even greater invasion of Calais.

Scottish preference for beer and whisky than Pujol. It also seems to have escaped their notice that Britain didn't use the metric system.

Once again, Juan Pujol contacted MI5 about spying for them, only this time he was able to reveal that he had been accepted as an agent by the German secret service. As a result, he got the job and came to Britain to work as a double agent codenamed Garbo.

In order to continue to enjoy both Abwehr's and Hitler's trust, Alaric used wireless transmissions to send accurate intelligence alongside the misinformation but when he passed genuine intelligence it arrived in such a way that it always too late to be useful.

Alaric laid the blame for errors on 27 non-existent sub-agents, whom he claimed reported to him from all over Britain. It was pure fiction, but the 27 had made-up names and identities. One of them was Stanley, a Welsh nationalist, who belonged to the notional Brothers of the Aryan World Order. Other sub-agents were the Portuguese travelling merchant, Carvalho, stationed in southern Wales, and a South African called Dick, who hated everything British above anything else on earth.

Even dead fictitious agents could be useful. When the sub-agent Gerbert died, Pujol arranged for an obituary to be placed in the local newspaper. He even managed to get his German handler to arrange a pension for Gerbert's sham widow.

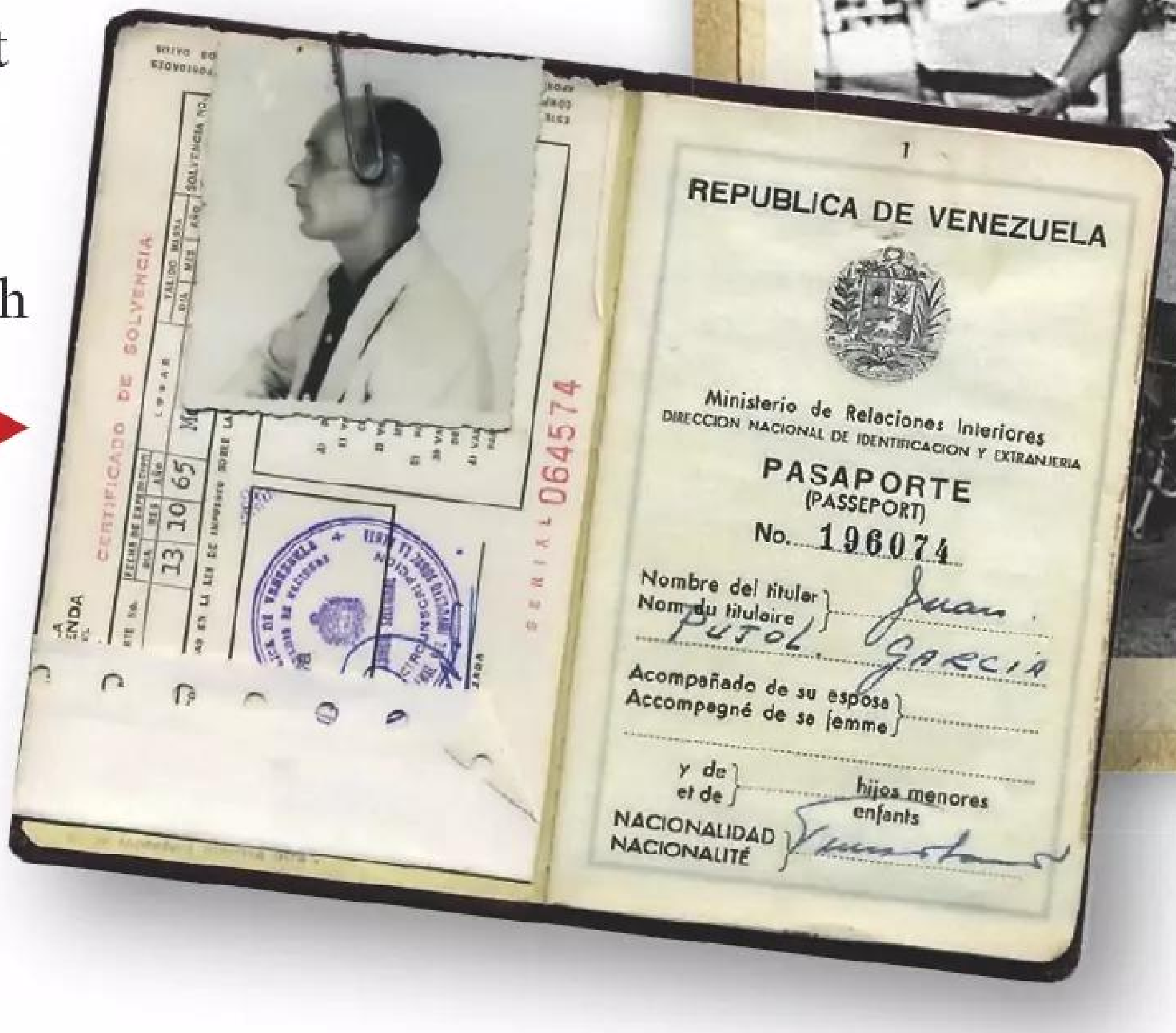
Confidence in agent Alaric was unwaveringly constant.

The insignia of General George S Patton's fake army boldly showed lightning striking.

Wife was also deceived

Pujol proved just how far he would go to continue working as a double agent in June 1943, when his role as an agent came into play in his private life. Pujol's Spanish wife, Araceli, who had faithfully helped Pujol pursue his great dream of working for MI5, was unhappy in cold and grey Britain. Pujol was always busy; she spoke no English and because of security concerns had been banned from interacting with other Spaniards in London.

When the pair were invited to a celebration at the Spanish embassy, she lost patience when Pujol refused to go. Araceli called to remonstrate with her husband's boss, Harris, stating that she ▶



SERIAL 064574

1

REPUBLICA DE VENEZUELA

Ministerio de Relaciones Interiores
DIRECCION NACIONAL DE IDENTIFICACION Y EXTRANJERIA

PASAPORTE
(PASSEPORT)
No. 196074

Nombre del titular / Nom du titulaire: Juan Pujol Garcia

Acompañado de su esposa / Accompagné de sa femme:

y de / et de: hijos menores / enfants

NACIONALIDAD / NACIONALITÉ:

MI5 faked Pujol's death from malaria in Angola in 1949, but in reality, he lived in Venezuela.

DOUBLE AGENT

Juan Pujol had multiple identities

Catalonian Juan Pujol had little success as a chicken farmer, manager of a hotel or as an army cavalry rider. As a double agent, on the other hand, he helped secure the Allied victory in World War II.

1 ***Before World War II, Pujol was forced to serve both Communists and Fascists in Spain. He abhorred both extremes and decided to fight against totalitarian regimes.***

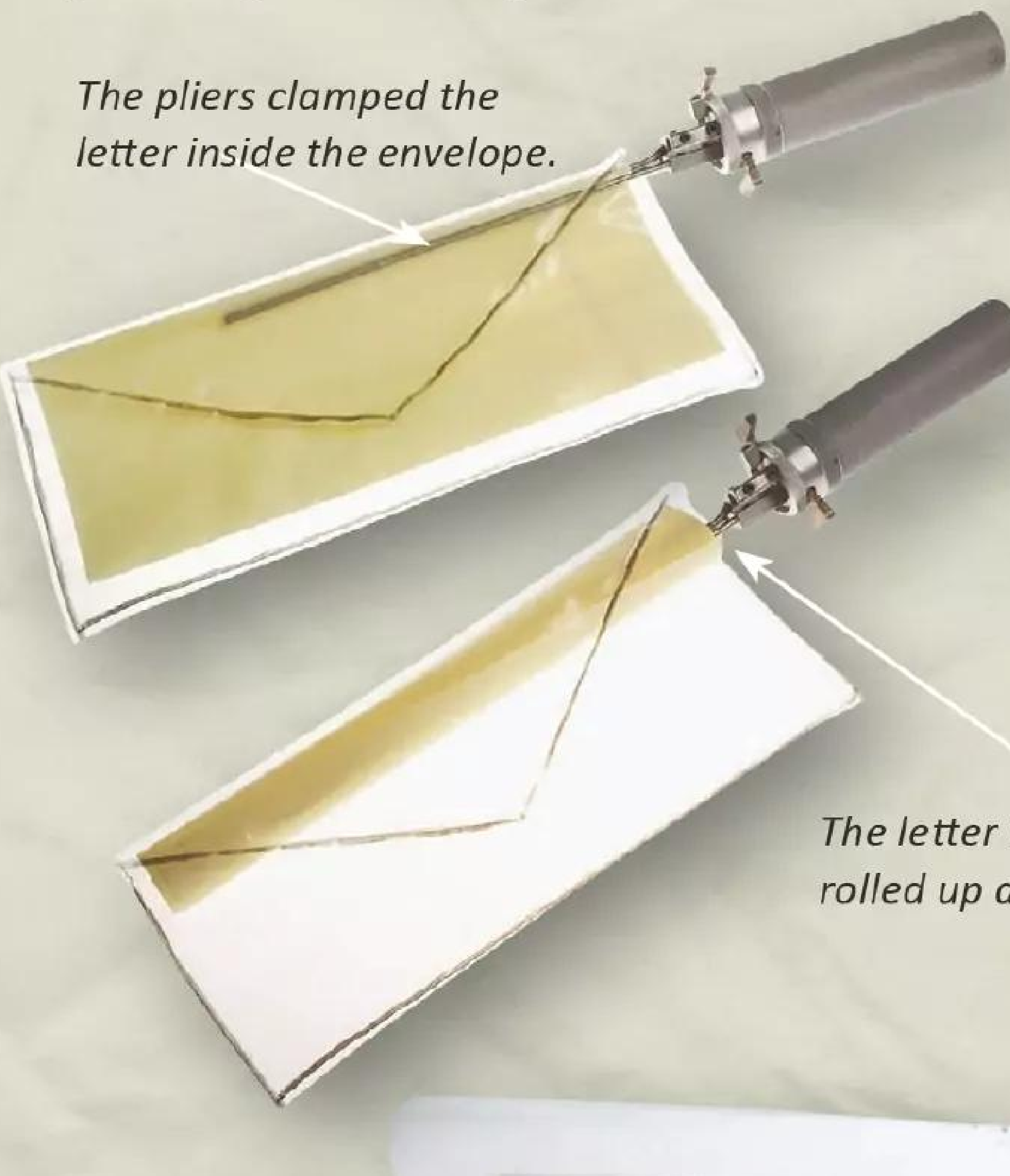
2 ***For the German intelligence service, Pujol was known as the skilled agent Alaric, on the other side of the channel as Garbo. At home, he was Juan Pujol.***

3 ***Pujol was married to Araceli who helped him to get hired by the British intelligence service. She wasn't always happy with life as an agent's wife, though.***

AGENT'S TOOLKIT

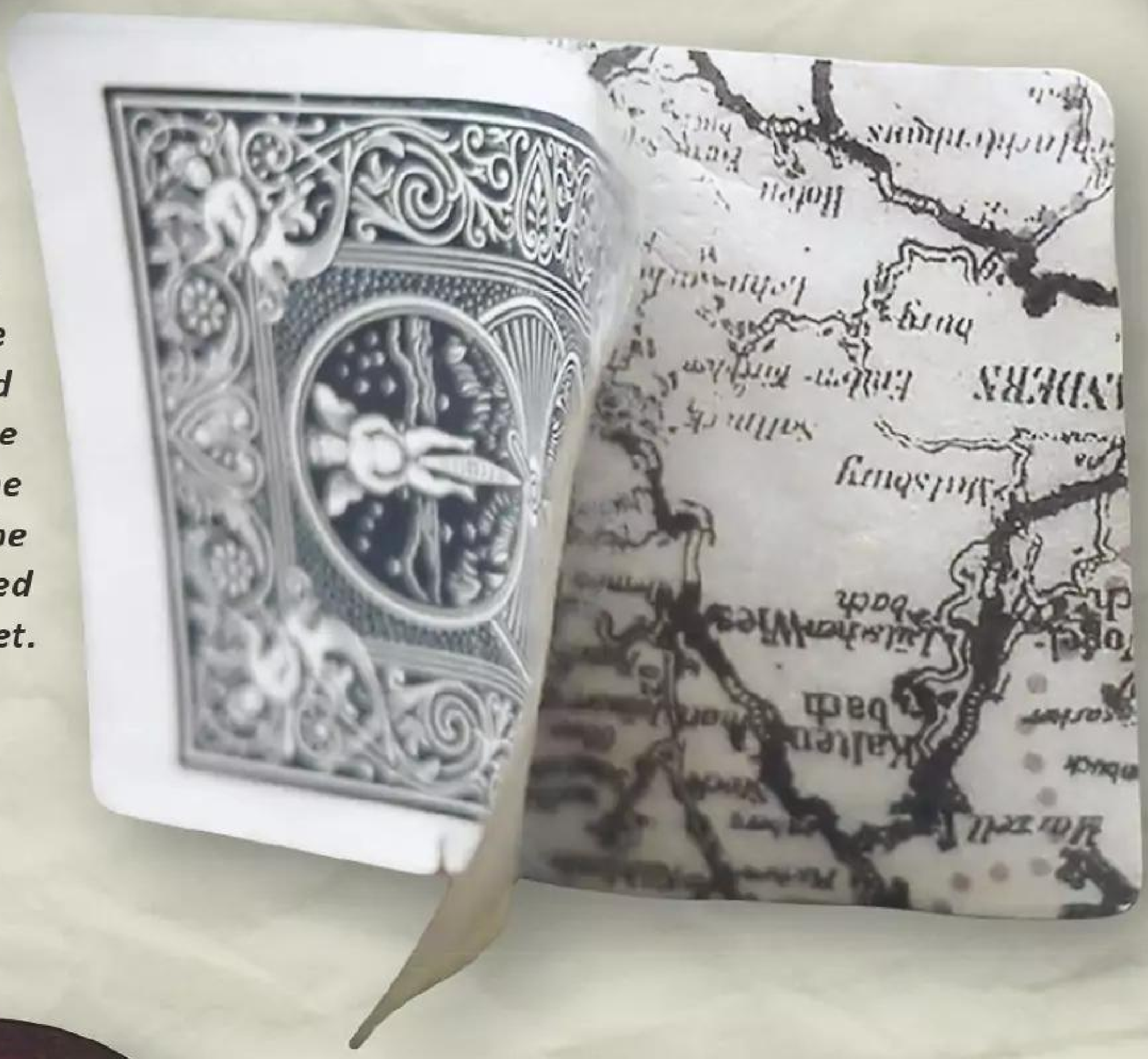
Creative minds devised a whole arsenal of new tools for World War II secret agents. With them, the agents could, for example, defend themselves, read confidential mail or take down the enemy.

This custom-made tool could be used to fish letters easily from unopened envelopes.

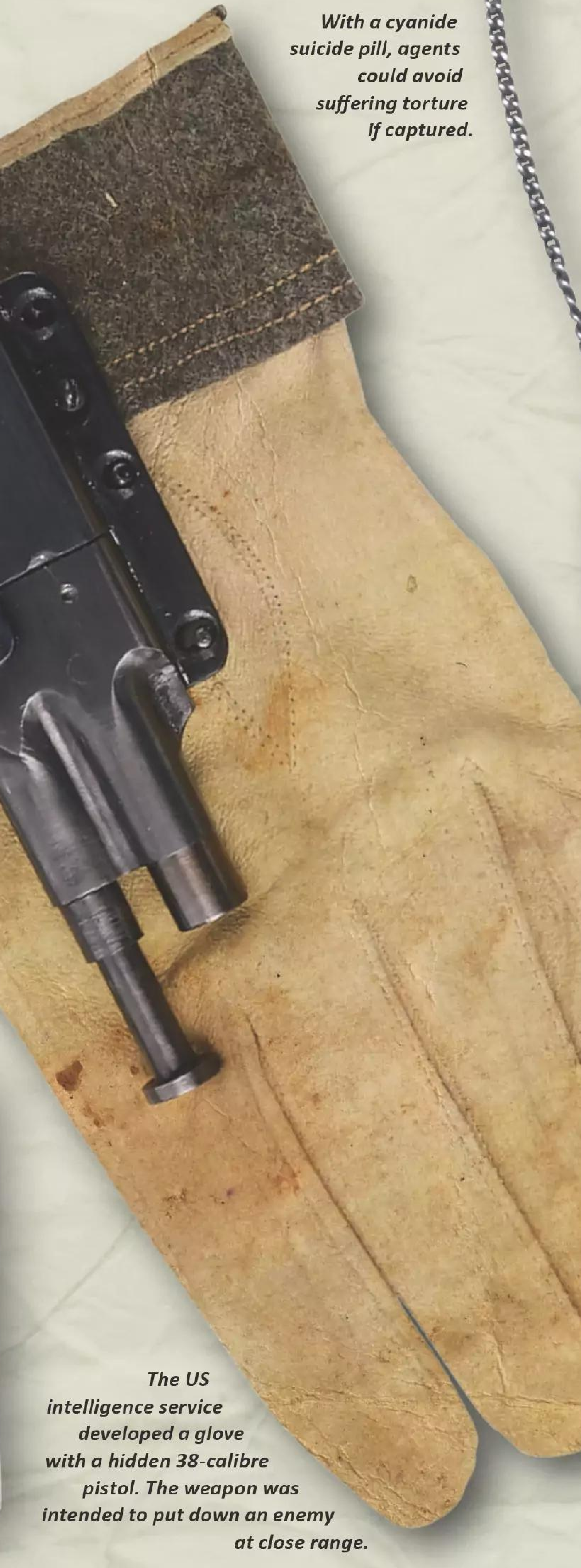


The pliers clamped the letter inside the envelope.

The letter was the rolled up and pulled out.

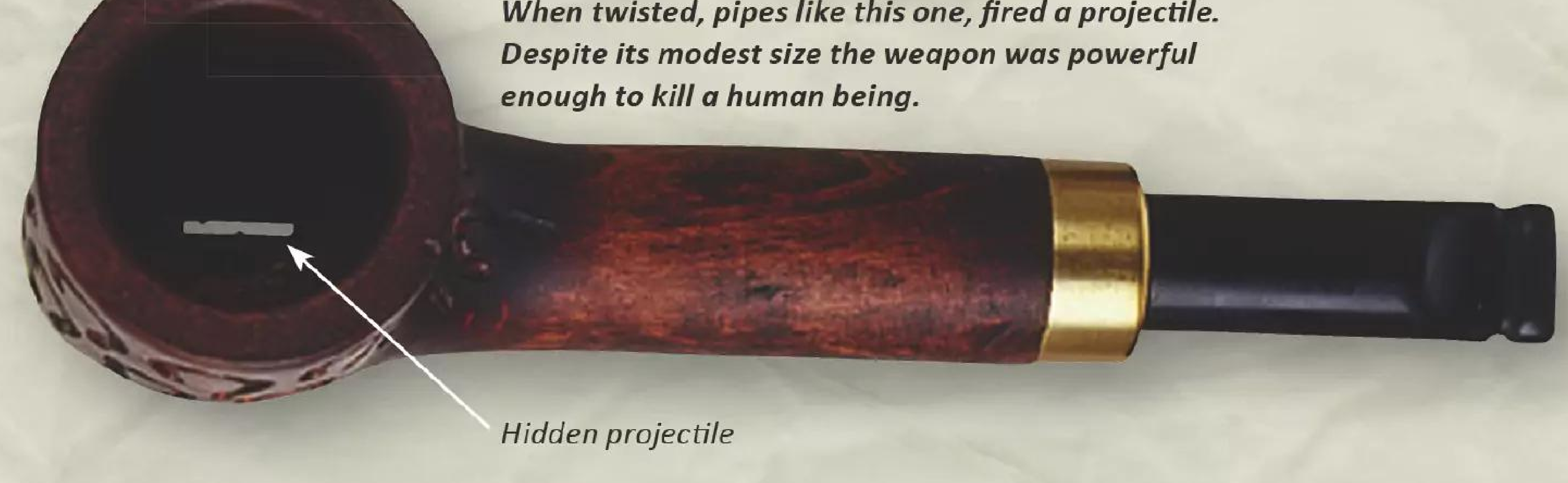


Playing cards with hidden maps inside helped Allied prisoners escape Germany. The cards could be separated when wet.



The US intelligence service developed a glove with a hidden 38-calibre pistol. The weapon was intended to put down an enemy at close range.

With a cyanide suicide pill, agents could avoid suffering torture if captured.



When twisted, pipes like this one, fired a projectile. Despite its modest size the weapon was powerful enough to kill a human being.

Hidden projectile

Match boxes were used to conceal miniature cameras.

would not stay on English soil five minutes longer. Furthermore, if she were not allowed to leave the country, she would go to the Spanish embassy and reveal the truth about her husband.

Pujol, who was abroad, quickly boarded a plane to return to London. Once there, he arranged an operation to fool his own wife. Shortly after her complaint, Araceli received a letter from her husband telling her that he had been arrested and that she should pack him a bag for his stay in prison.

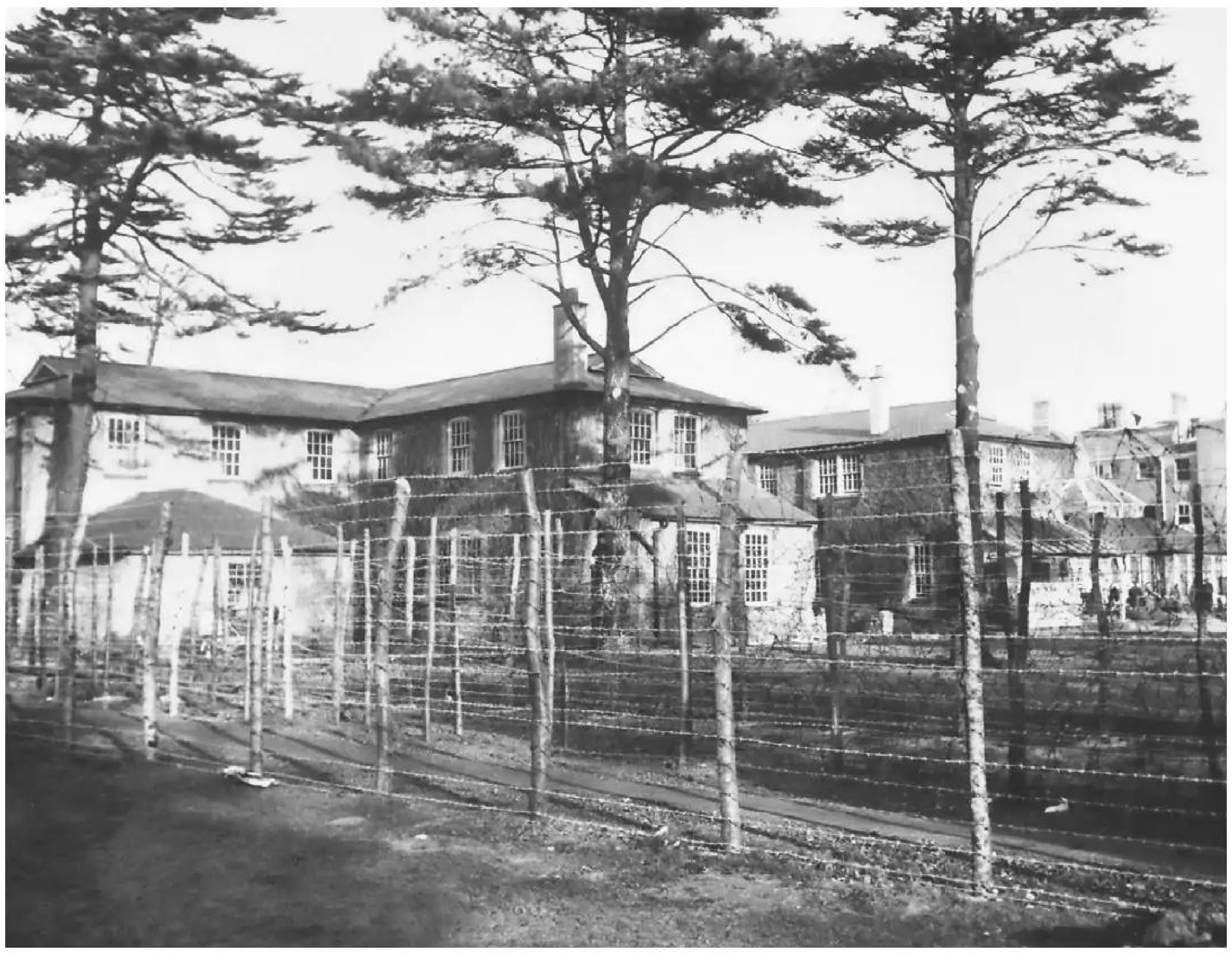
With tears flowing down her cheeks, Araceli again called on Harris, who told her that she would have to leave England because of her outburst and that Pujol would be leave with her. He said that when her husband had been told that he had to give up his job, he had been so furious with his MI5 bosses that they'd called the police and had him arrested.

Chastened, Araceli defended her husband's right to stay, claiming he was doing important work. Shortly afterwards, however, she changed tack once more and again called Harris to tell him she was going to flee with the couple's child. The agent's handler went to their apartment only to find Pujol's wife had apparently attempted to commit suicide by opening all the gas taps. Harris assigned a man to monitor the distraught Araceli.

The next day, Araceli promised to stay in England, if only they would release her husband. She was blindfolded and taken to Pujol's staged cell. Overcome with emotion, Araceli promised that she would fully support her husband in his work.

Revealed D-Day

It was one thing to fool his wife, but the question remained whether Pujol could hoodwink Hitler when it really mattered. In the first days of June 1944, Operation Bodyguard was put into full swing. Wireless operators and double agents transmitted unambiguous reports that an invasion of Pas-de-Calais was imminent. Garbo reiterated the message.



In Camp 020 in south-west London, captured German agents were interrogated and 'persuaded' to change sides in the war.

The hoax's big finale played out overnight on 5th-6th June in the house at Crespigny Road in London, where Garbo, TAR, Harris, Fleetwood-Hesketh and Haines stood around the wireless radio transmitter. Harris had emphasised the need for Garbo to send accurate intelligence to the Germans if they were to continue to trust him. The men had therefore agreed that the double agent should expose the impending Allied invasion of Normandy.

"The men had therefore agreed that the double agent should expose the impending Allied invasion of Normandy".

Alaric had told Abwehr that he would send them an important message at 03.00 and that they should be ready to receive it. The double agent had, however, calculated that a radio signal relayed by the wireless switching centre in Madrid would be delayed by a good three hours, and that the Germans would not receive his message before 06.00, when the attack would already be underway. At 03.00, Pujol sent this cryptic message to Abwehr.

"He [Alaric's sub-agent Fred] states that he wrote to me three days ago announcing anew the distributions of cold rations and vomit bags, etc to the Third Canadian Division... [who now] had embarked."

The Germans couldn't fail to understand the importance of the message. If the Canadians had left their camp and not returned, it could only mean one thing: they had set sail for France. Hiltingbury – which Garbo had previously told the Germans was the 3rd Canadian Infantry's base – was just over 10 kilometres north of Southampton, which lay just across the channel from Cherbourg in West Normandy. It was therefore reasonable to assume that the troops intended to land there.

To the surprise of the five men waiting in Crespigny Road there was no response from the Germans, even after 06.00. It was only eight hours later that they received confirmation that the message had been received. By that time, the fight on the Normandy beaches was already raging.

The Germans held Alaric in even greater regard following his announcement – even if they didn't get the information in time.

The lie held during the invasion

Even after the first troops had landed on 6th June, Alaric persuaded Hitler that the invasion was merely a diversion for an even greater assault being planned at Calais. All Pujol needed do was to send this message to his German contacts.

"After a personal consultation with my agents... I am of the opinion, in view of the strong troop concentrations in south east and east England, that these operations [the operations around the Caen area] are a diversionary manoeuvre."

Abwehr handed the message to Hitler, who simply took the agent at his word without further investigation.

Operation Bodyguard had been more successful than the Allies could have dared to dream. On 25th November, 1944, Garbo was awarded an MBE by King George VI for his efforts during the Double-Cross operation. He was able to put it next to the Iron Cross, which the Germans had bestowed on Alaric four months earlier on 29th July — to recognise the work of one of their most trusted agents, a man whom they continued to trust in blindly for the duration of the war.

DUŠAN POPOV *1912-1981*

THE MODEL FOR JAMES BOND

Serbian Dušan Popov was born in Austria-Hungary and spoke fluent German. He gained many influential German friends in the Third Reich, but he secretly despised the Nazis, with whom he'd had bad experiences with during his days as a student. When Popov was offered work as an agent with the Abwehr, he immediately contacted the British authorities and was hired by MI5 as a double agent and given the codename Tricycle. His German case officer called him Ivan. Under the cover of being a businessman, he travelled around Europe and provided intelligence to both sides in the war – true reports to the Allies, fake ones to the Germans. Beside his role as a double agent, he was famous for his expensive lifestyle, extravagant parties and seducing beautiful women. He had a relationship with the French movie star Simone Simon, among many others. Popov is said to be one of the sources of inspiration for Ian Fleming's James Bond character.

Double agent for MI5 – Wild, expensive lifestyle – Inspiration for James Bond

Die Tigerfibel

The ABC of tanks

Amid the ongoing war, the German army revolutionised tank training. *Die Tigerfibel* was an easy-to-read, training **manual** with entertaining illustrations that would also provide support on the battlefield.

Text: **HARALD SONESSON**

In 1943, as the war entered its fifth year, the German Army was still an enemy to be reckoned with, growing in both numbers and armoured strength. During that year, combat vehicle production had increased from around 10,000 in 1942 to over 25,000.

Although no new armoured divisions were set up that year, the new tanks were needed to replace losses and equip new and – in some cases – reorganised infantry departments such as the SS and Luftwaffe. The forces now not only consisted of vehicles, but also commanders and soldiers.

Until the spring of 1943, training remained largely as it was before the outbreak of war. A *Kurzausbildung* (short training) course was now introduced to handle the increasingly strained training system. The reduced time in training meant there was a great need for thinking about how people should be trained as well as the need to continue with practical training when commanders and soldiers were in the field.

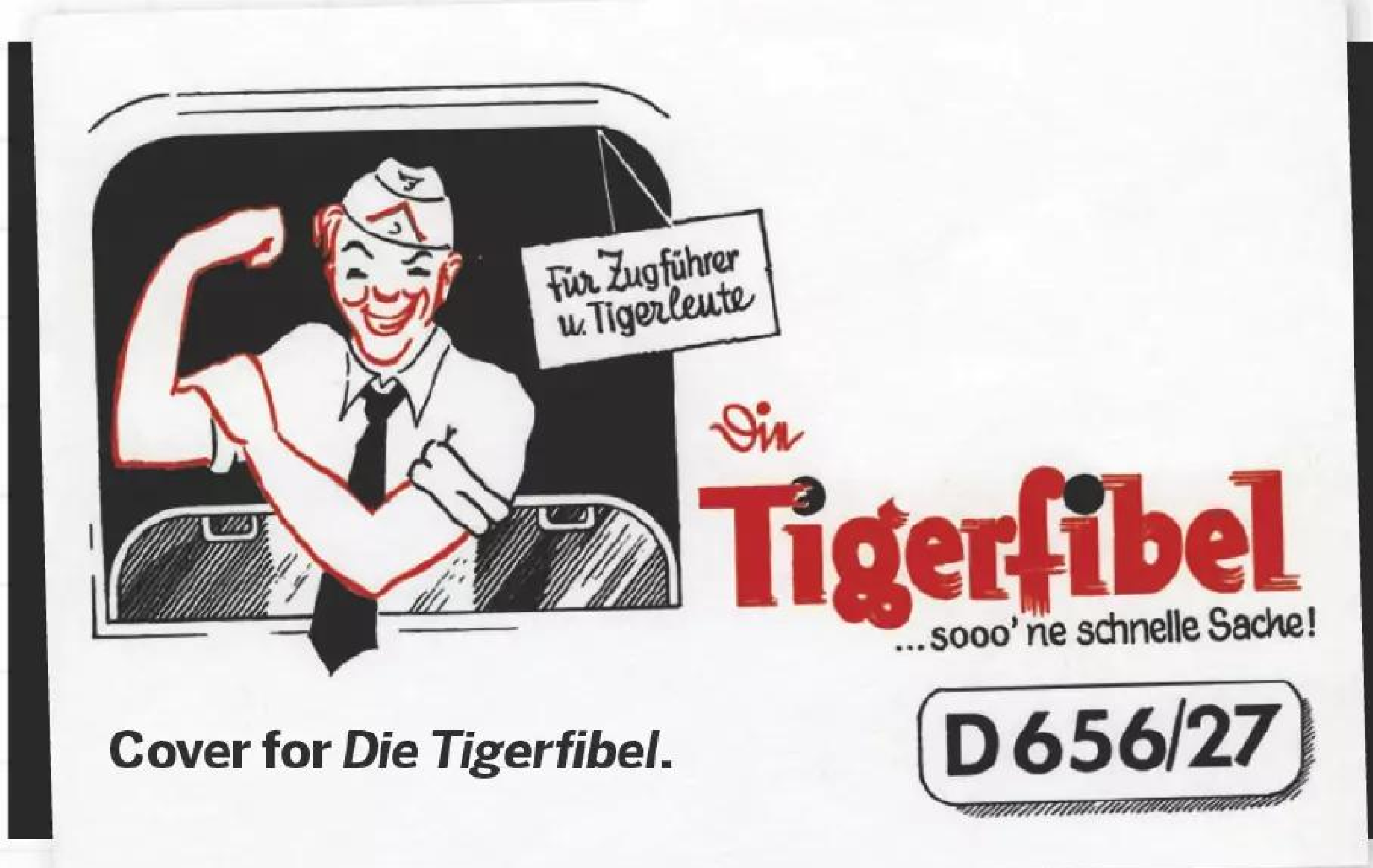
EVEN THOUGH THE training period was shortened, it was similar to what had gone before: lectures in halls mixed with practical sessions in the tank.

Generaloblerst (Colonel General) Heinz Guderian, Inspector General of Armoured Troops, was compelled to issue an order in May 1943 demanding that training must focus on the essentials and where one could gain critical knowledge, such as fighting in the dark or over unpredictable terrain.

Oberst (Colonel) Hans Christern was appointed head of training for the armoured troops on 1st April, 1943. As a battalion commander in Panzer-Division 31, he had been awarded the Knight's Cross for his efforts during the campaign in France. From 1941-43 he was a tactical instructor, superintendent and finally director of the training unit as he had proved his ability to organise and train soldiers.

CHRISTERN SAW THE need to develop a new type of textbook for the new and significantly more complicated Panzer VI, or Tiger I. Existing combat and technical manuals were – as you'd associate with today's military teaching materials – somewhat dry and formal.

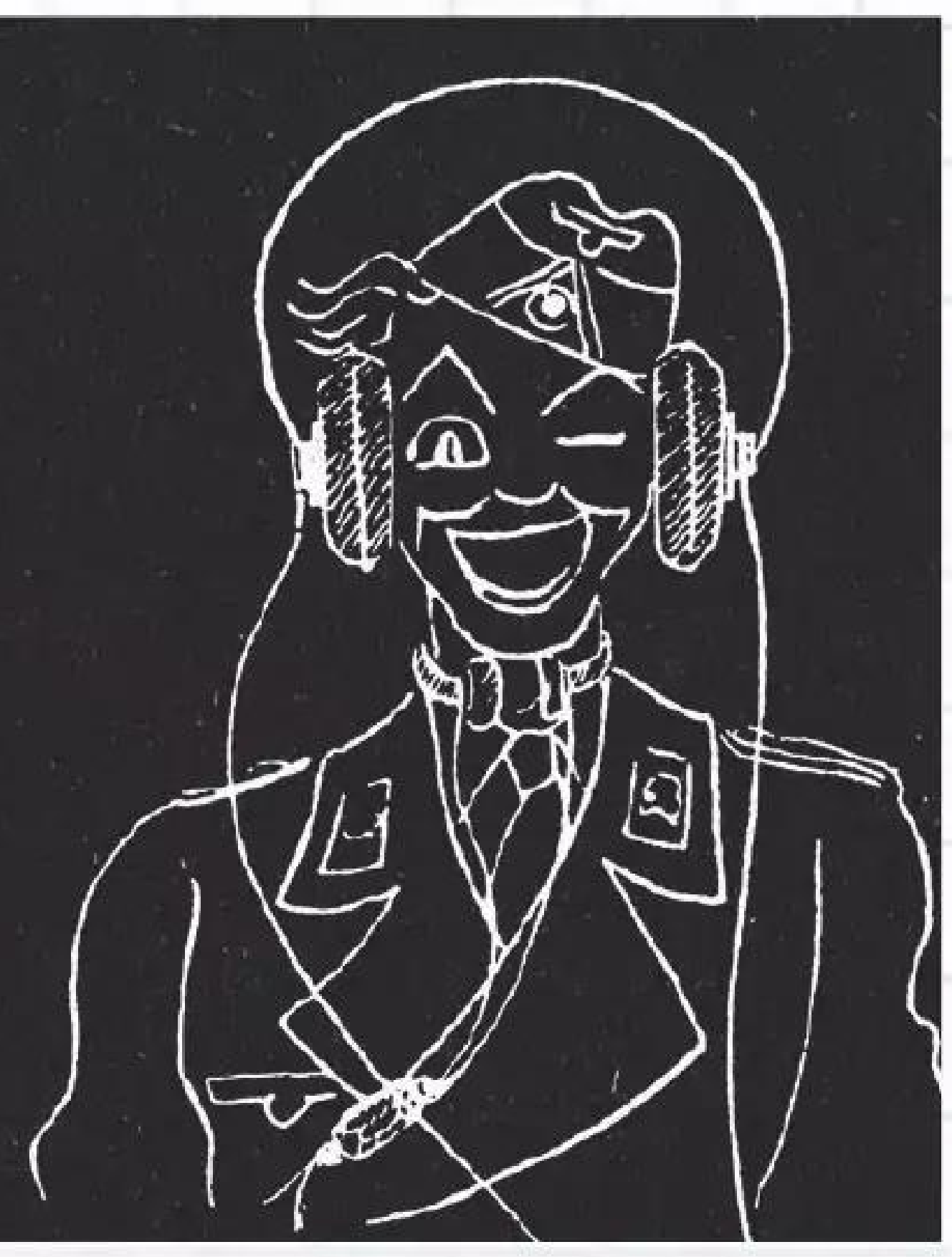
The assignment to produce a new textbook went to Lieutenant Josef von Glatter-Götz. His challenge was to find a format that could both convey



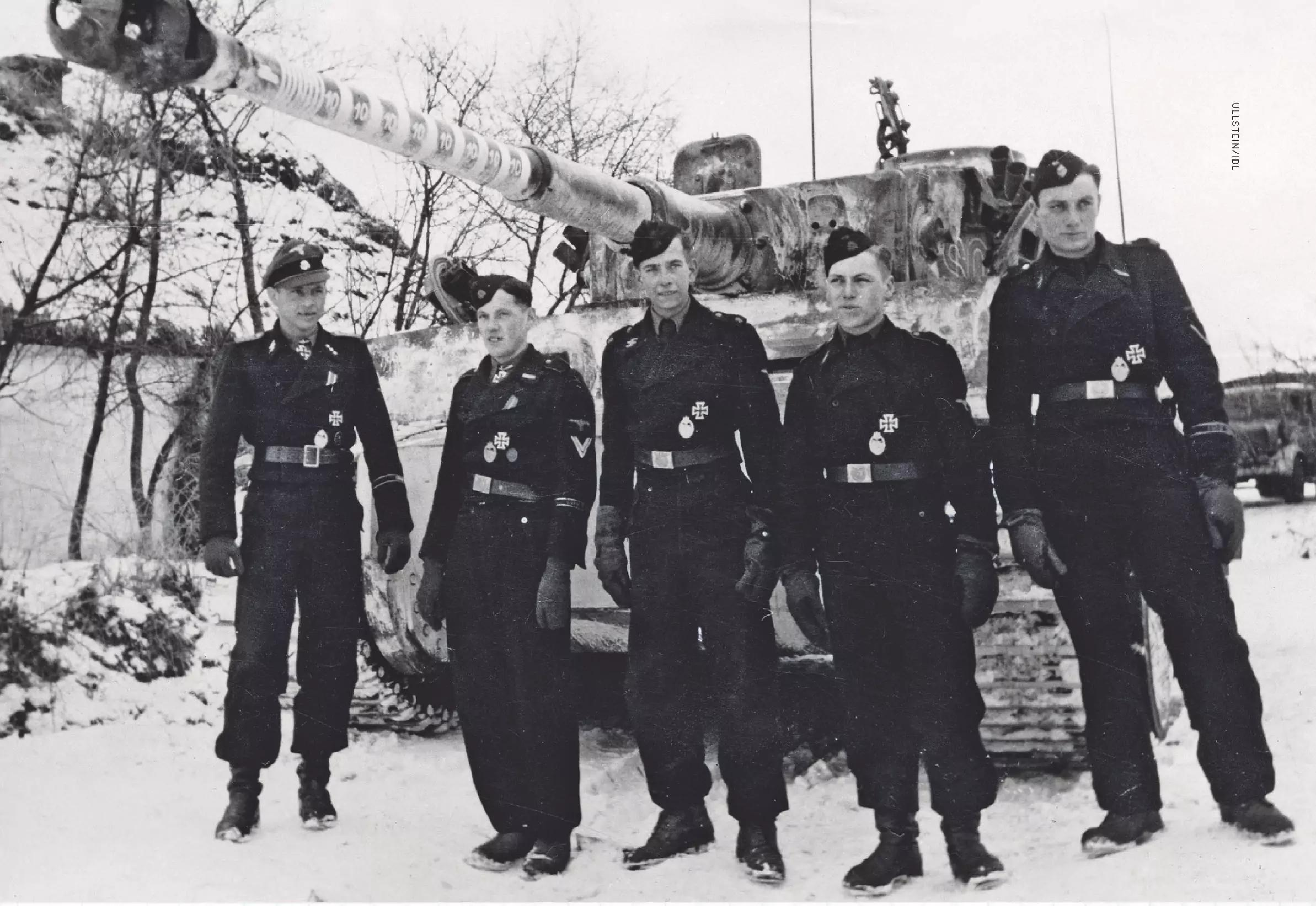
Cover for *Die Tigerfibel*.

Radio operator: Piepmatz, the Decrypter

★ The shortest chapter features "Piepmatz, the Decrypter". It discusses how to set up the communication equipment, the internal comms system and also transmission and reception.



ALL PICTURES FROM TIGERFIBEL WITH PERMISSION FROM MELCHIOR HISTORISCHER VERLAG



ULLSTEIN/IBL

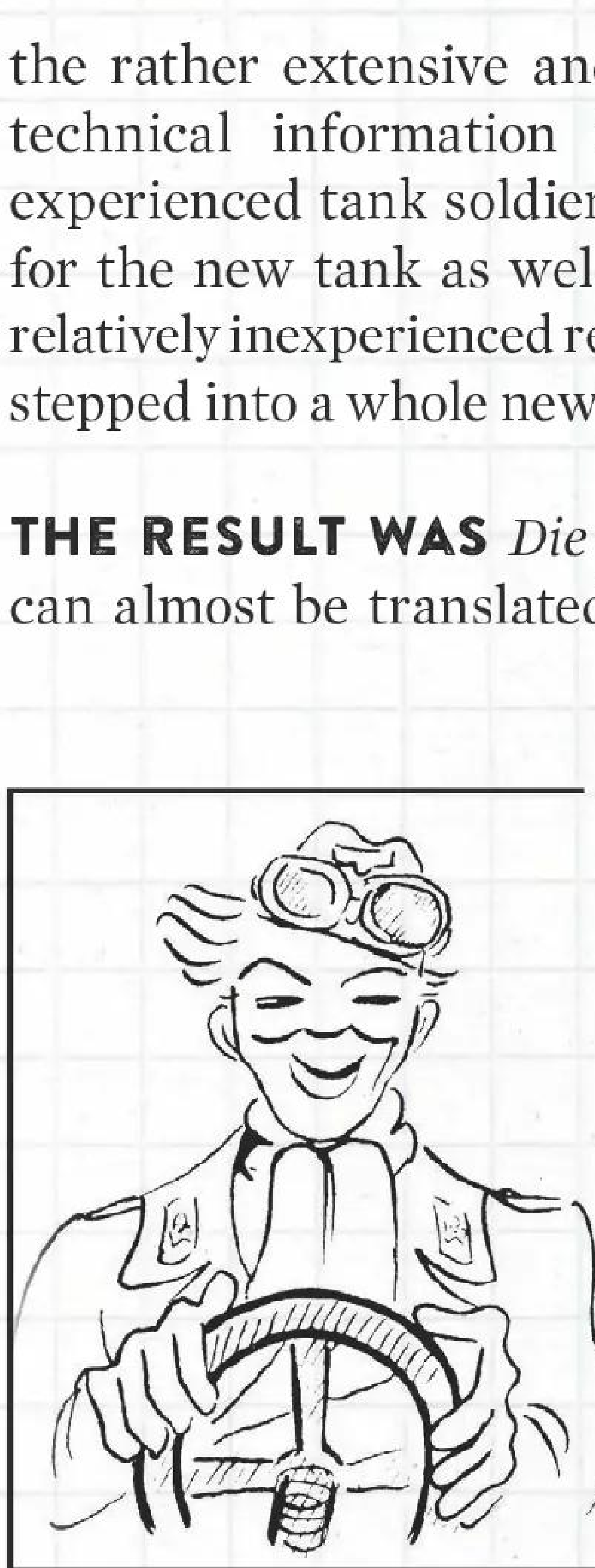
A crew from the Waffen-SS in front of their Tiger I on the Eastern Front in February 1944. Tank commander Michael Wittman and the gunner (on the left) have just been awarded the Knight's Cross of the Iron Cross, while the others wear their newly awarded Iron Crosses on their chest after taking out 88 Soviet tanks, the 'kills' marked by white rings on the gun barrel.

the rather extensive and somewhat technical information to partially experienced tank soldiers retraining for the new tank as well as instruct relatively inexperienced recruits who'd stepped into a whole new world.

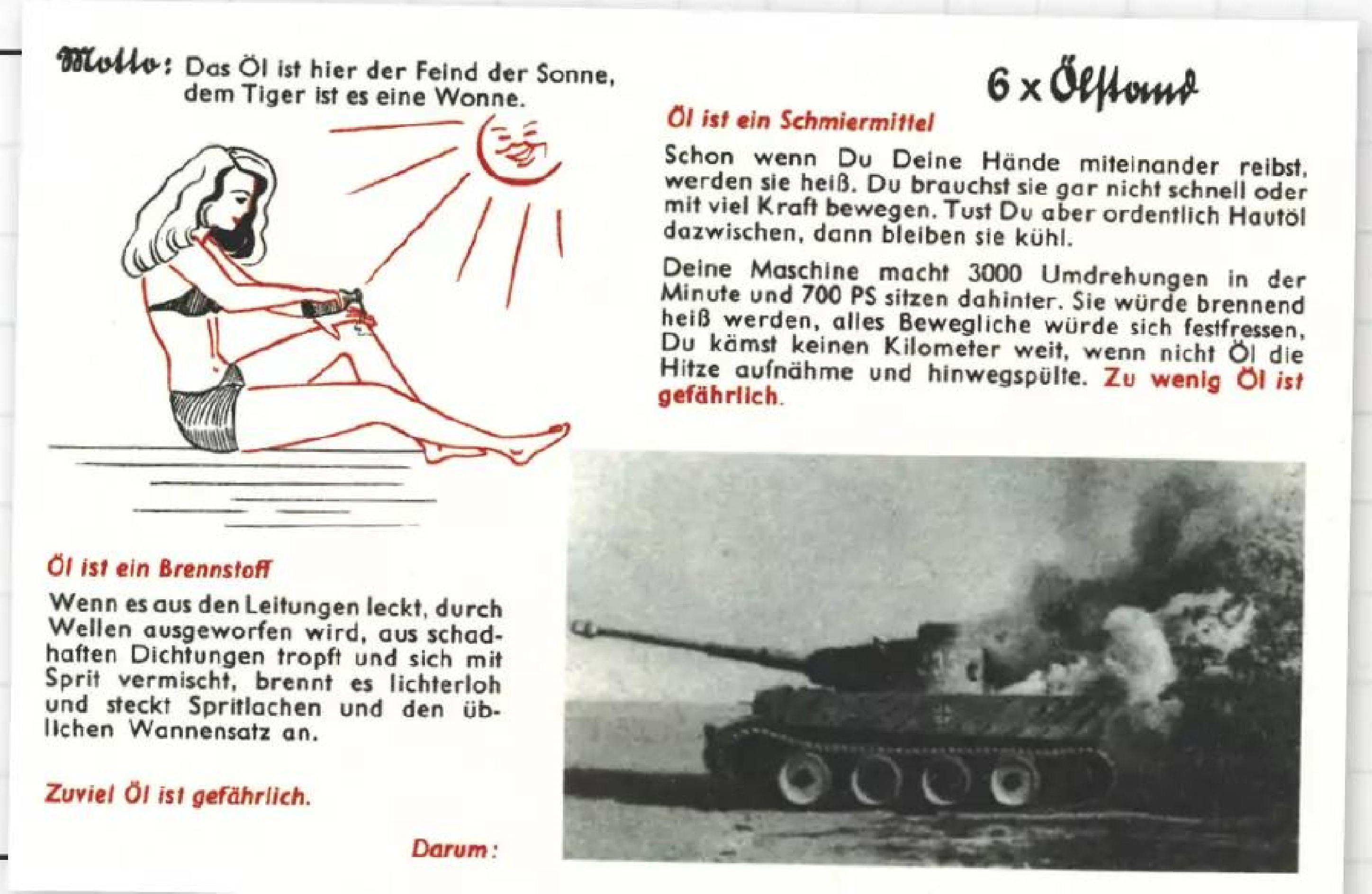
THE RESULT WAS *Die Tigerfibel.* It can almost be translated as an ABC book. The new instruction manual was approved by Guderian on 1st August, 1943. The book's instructions differ significantly from the usual standards for an instruction manual. Facts were mixed with verses, cartoons, photographs and technical illustrations in such a way that the target audience would hopefully absorb the important information and easily remember it when it came to using it. The relatively light-hearted girl Elvira was used to capture the interest of the manual's male readers.

The book is divided into chapters, each one addressing some of the crew's roles in the tank. For example, the driver "Gustav, the Land Rover" or ▶

Driver: Gustav, the Land Rover



★ Almost half the book is aimed at the tank driver "Gustav", reflecting his responsibilities in keeping the tank – apart from the turret – in order. According to the book, he should set aside two hours each day for maintenance. On the right, the correct amount of oil in the engine must be set when driving – comparable to the amount of sunscreen applied to a sunbathing girl.



Motto: Das Öl ist hier der Feind der Sonne,
dem Tiger ist es eine Wonne.

6 x Ölstand

Öl ist ein Schmiermittel

Schon wenn Du Deine Hände miteinander reibst, werden sie heiß. Du brauchst sie gar nicht schnell oder mit viel Kraft bewegen. Tust Du aber ordentlich Hautöl dazwischen, dann bleiben sie kühl.

Deine Maschine macht 3000 Umdrehungen in der Minute und 700 PS sitzen dahinter. Sie würde brennend heiß werden, alles Bewegliche würde sich festfressen, Du kämst keinen Kilometer weit, wenn nicht Öl die Hitze aufnähme und hinwegspülte. *Zu wenig Öl ist gefährlich.*

Öl ist ein Brennstoff

Wenn es aus den Leitungen leckt, durch Wellen ausgeworfen wird, aus schadhaften Dichtungen tropft und sich mit Sprit vermischt, brennt es lichterloh und steckt Spritlachen und den üblichen Wannensatz an.

Zuviel Öl ist gefährlich.

Darum:

the loader "Hülsensack, the Indefatigable". It was adapted for self-study and also served as support for the training it assumed would continue in the field.

DIE TIGERFIBEL STARTS with tales about how easy the Tiger tank is to run, how powerful it is, how good the protection is. But, even if it can't be destroyed from the outside, it can be destroyed from within: "Study your Tiger primer well, or your Tiger goes to hell!"

Die Tigerfibel's success led to follow-ups. In July 1944 came *Die Pantherfibel* for the purpose of the Panzer V 'Panther'.Even the Luftwaffe tested the concept with *Horrido Des Jägers Schiessfibel* ('Horrido – The Hunter's Primer'), which was approved on 23rd June, 1944 by *Generalleutnant* (Lieutenant General) Adolf Galland.

After the war ended, the newly created *Bundeswehr* (post-war German armed forces) used the same concept in some cases. The idea was later forgotten and the military went back to its traditional method of communicating knowledge using both instructions and regulations that were presented in a very dry and straight manner.

EN DAG MED BANDKANON...
Kungl Arméförvaltningen 1968
M7790-000200

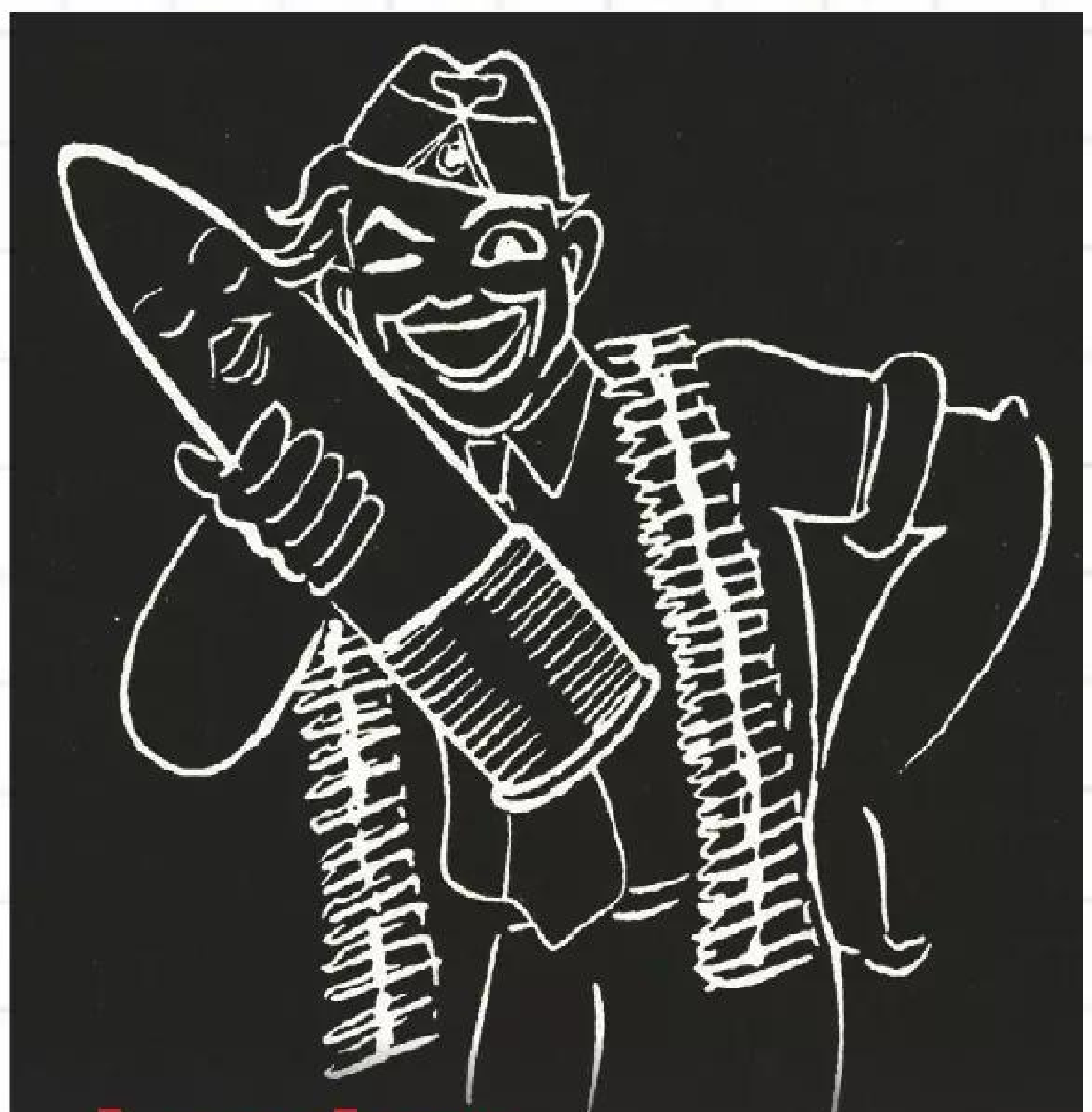
Swedish booklet *One day with the Bandkanon.*

THAT SAID, THE Swedish Army is one built on the *fibel* style. In 1968, *En dag med bandkanon* ('One day with the Bandkanon' – Bandkanon being a Swedish artillery vehicle) was published. Booklets describing Swedish tanks were also published. Their biggest difference is that the focus in on operation of the vehicles in peacetime and there are fewer details. They work more as a memory trigger rather than a full-blown manual. There's also an absence of scantily clad women. ✪

Harald Sonesson is a reserve officer with a background in the tank service.

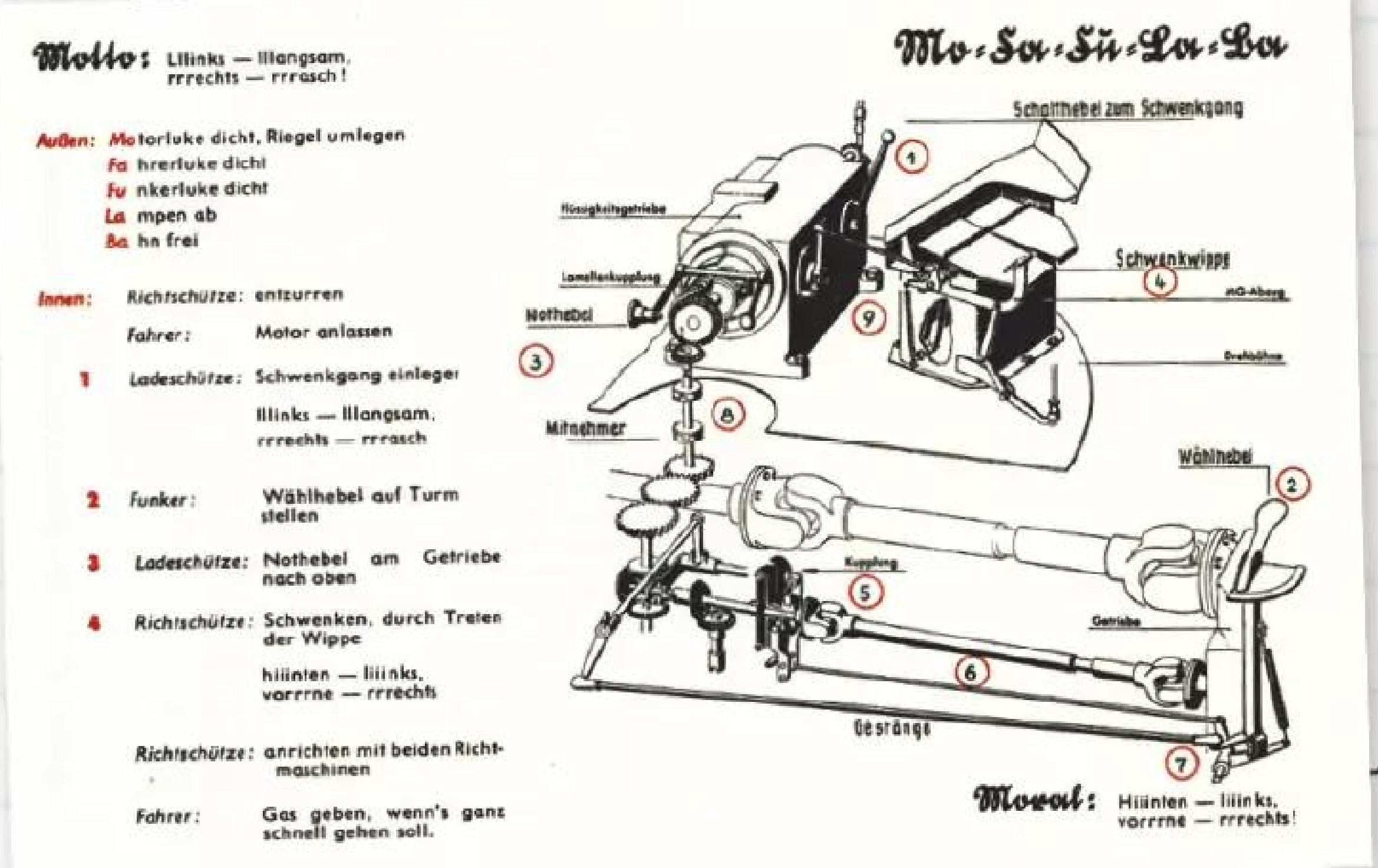
Further reading: *Die Tigerfibel* is translated and edited by Bob Carruthers, 2011.

Online reading: *Tigerfibel* (original German): https://archive.org/details/tigerfibel ★ Pantherfibel: panther1944.de/de/sdkfz-171-pzkpfwg-panther/vorschriften-zum-panther/panther-fibel/ ★ Shiessfibel: www.lexikon-der-wehrmacht.de/Vorschriften/Schiessfibel.pdf



Loader: Hülsensack, the Indefatigable

★ **In this chapter, the loader "Hülsensack, the Indefatigable" reminds us about ammunition handling, preparation before and during firing, operating the machine guns, the turret's rotating system and spotting failures. The page below describes each crew member's responsibility when the turret is being moved into position.**



Motto: Llinks — llangsam,
rrrechts — rrrasch!

Mo-Fa-Fu-La-Ba

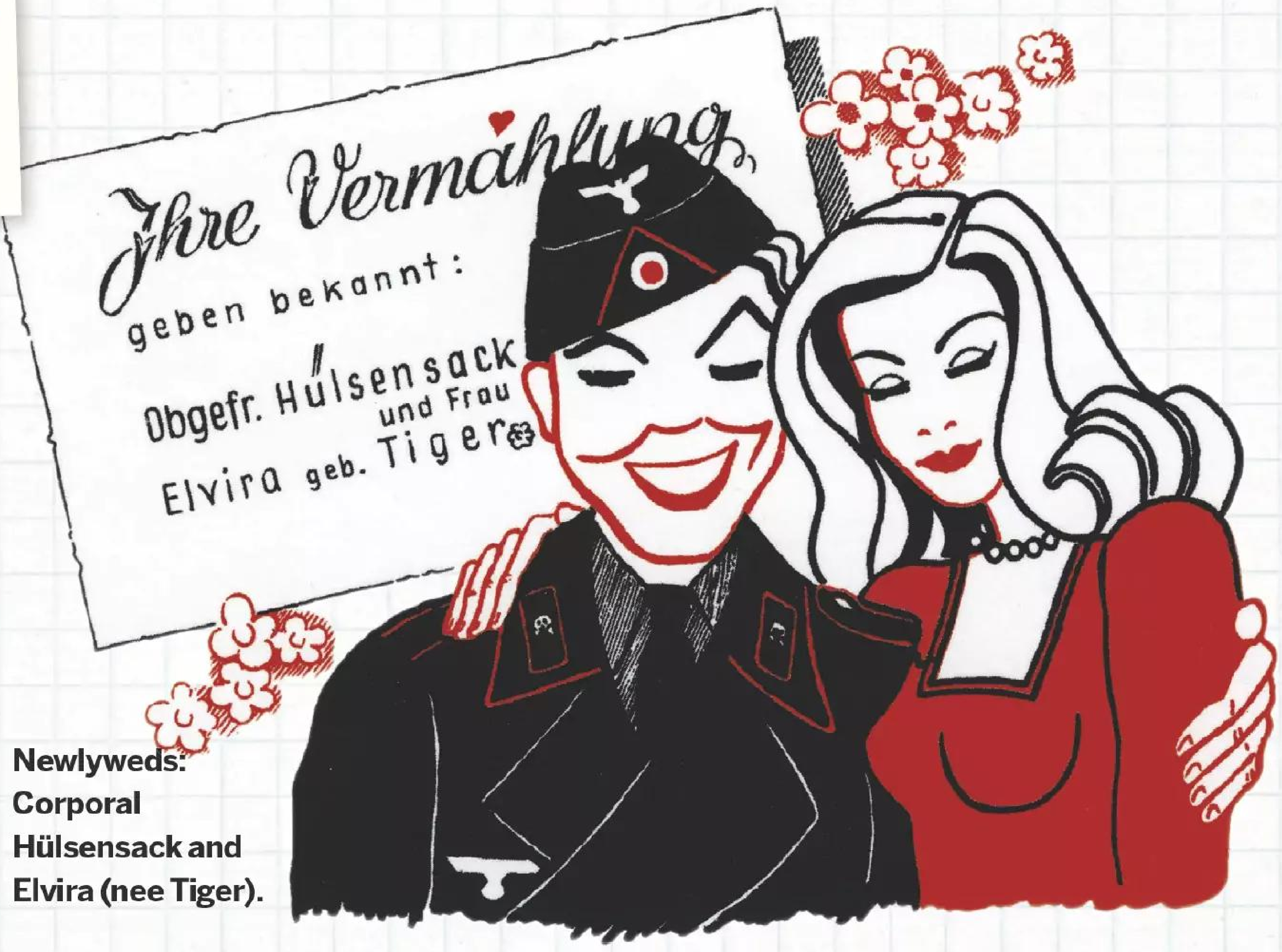
Außen: Motorluke dicht, Riegel umlegen
Fahrerluke dicht
Funkerluke dicht
Lampen ab
Bahn frei

Innen: Richtschütze: entzurren
Fahrer: Motor anlassen
1 Ladeschütze: Schwenkgang einleger
llinks — llangsam,
rrrechts — rrrasch
2 Funker: Wählhebel auf Turm stellen
3 Ladeschütze: Nothebel am Getriebe nach oben
4 Richtschütze: Schwenken, durch Treten der Wippe
hiiinten — liiinks,
vorrrne — rrrechts
Richtschütze: anrichten mit beiden Richtmaschinen
Fahrer: Gas geben, wenn's ganz schnell gehen soll.

Moral: Hiiinten — liiinks,
vorrrne — rrrechts!

A final call to the crew

★ **The last chapter addresses the entire crew – it's about saving on ammunition, fuel and the tank itself. The men receive this final rallying call: "Men of the Tiger! Save! Make good use of the thick armour! Be resolute! It's cheaper to overrun than to fire the machine gun! The machine gun is cheaper than the cannon!"**



Newlyweds: Corporal Hülsensack and Elvira (nee Tiger).

Tank commander: Schnellmerker, the Quick Thinker

★ The chapter dedicated to the tank commander – "Schnellmerker, the Quick Thinker" – is about fire command and cooperation within the crew by firing, positioning of the tank to provide maximum armour protection, the most dangerous angles, battle distance and duel force, all linked to information in the book's appendix. The first appendix is the Tank Identification Chart – Russia, with pictures and data of the tanks found on the Eastern Front.

The second is an armour location chart for the 88-mm KwK 36 tank gun. It shows where to target enemy tanks and at what distance is needed for penetrating their front using different ammunition types.

The final appendix shows five combat maps that reveal the distance that the Tiger could penetrate or could be penetrated by enemy tanks. The triangles and silhouettes on the right-hand side are a scale for the lines helping to measure range and sight at various distances. They're marked where one could expect to penetrate the enemy's armour.

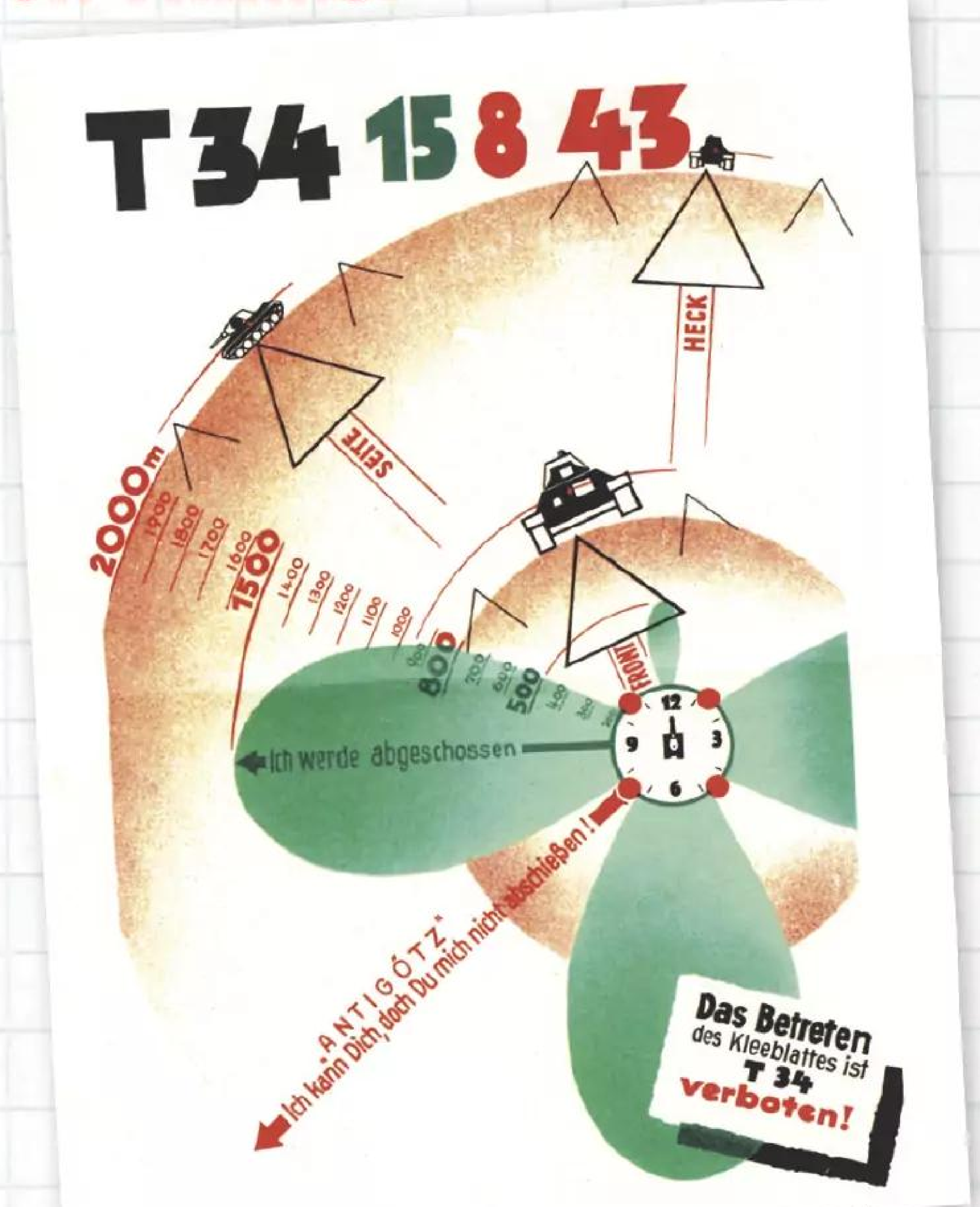
The notes for **T-34, 15 8 43**, read as follows:

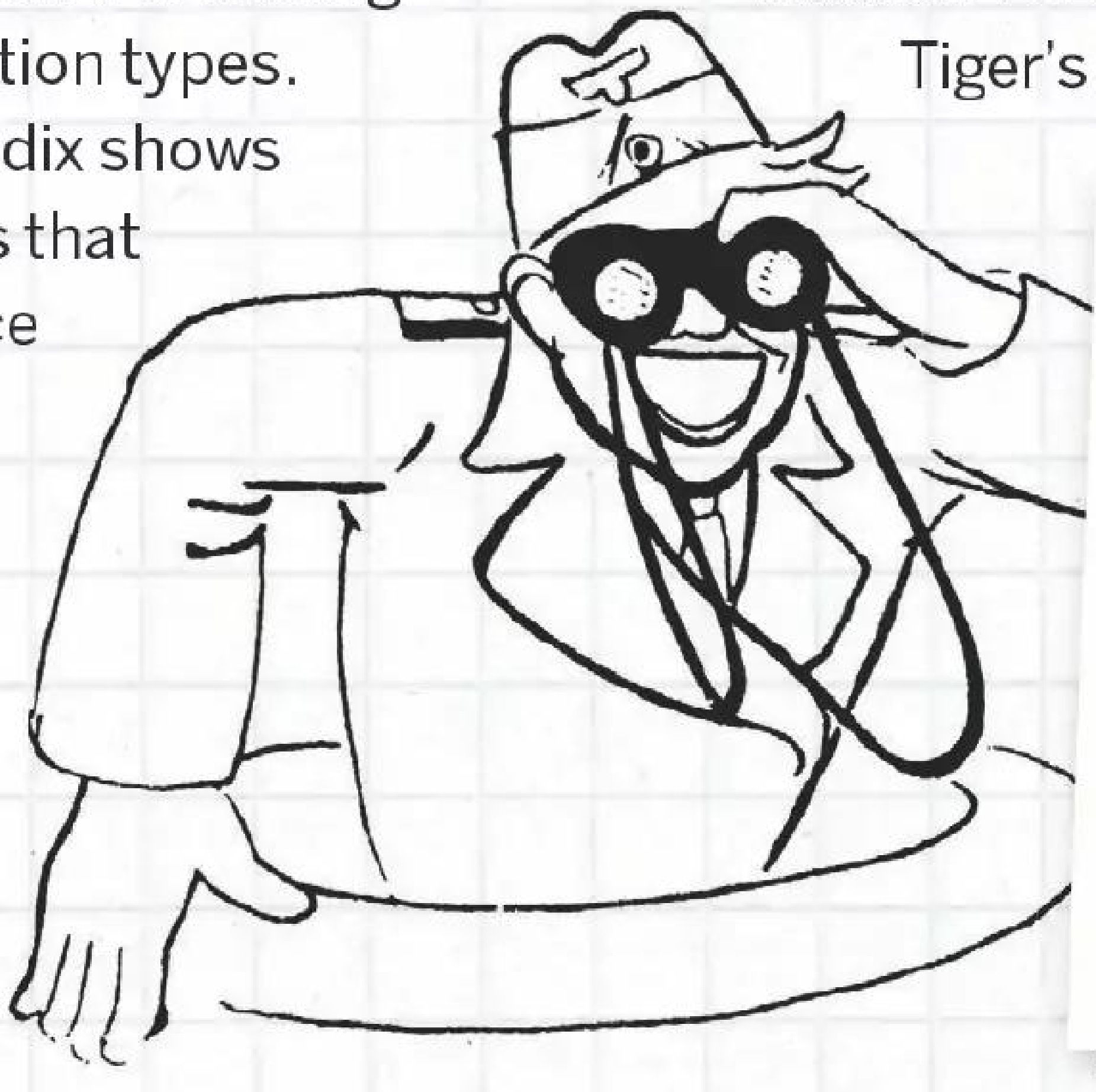
15: he can penetrate my sides and rear at 1,500 metres (and the front 1,000 metres closer).

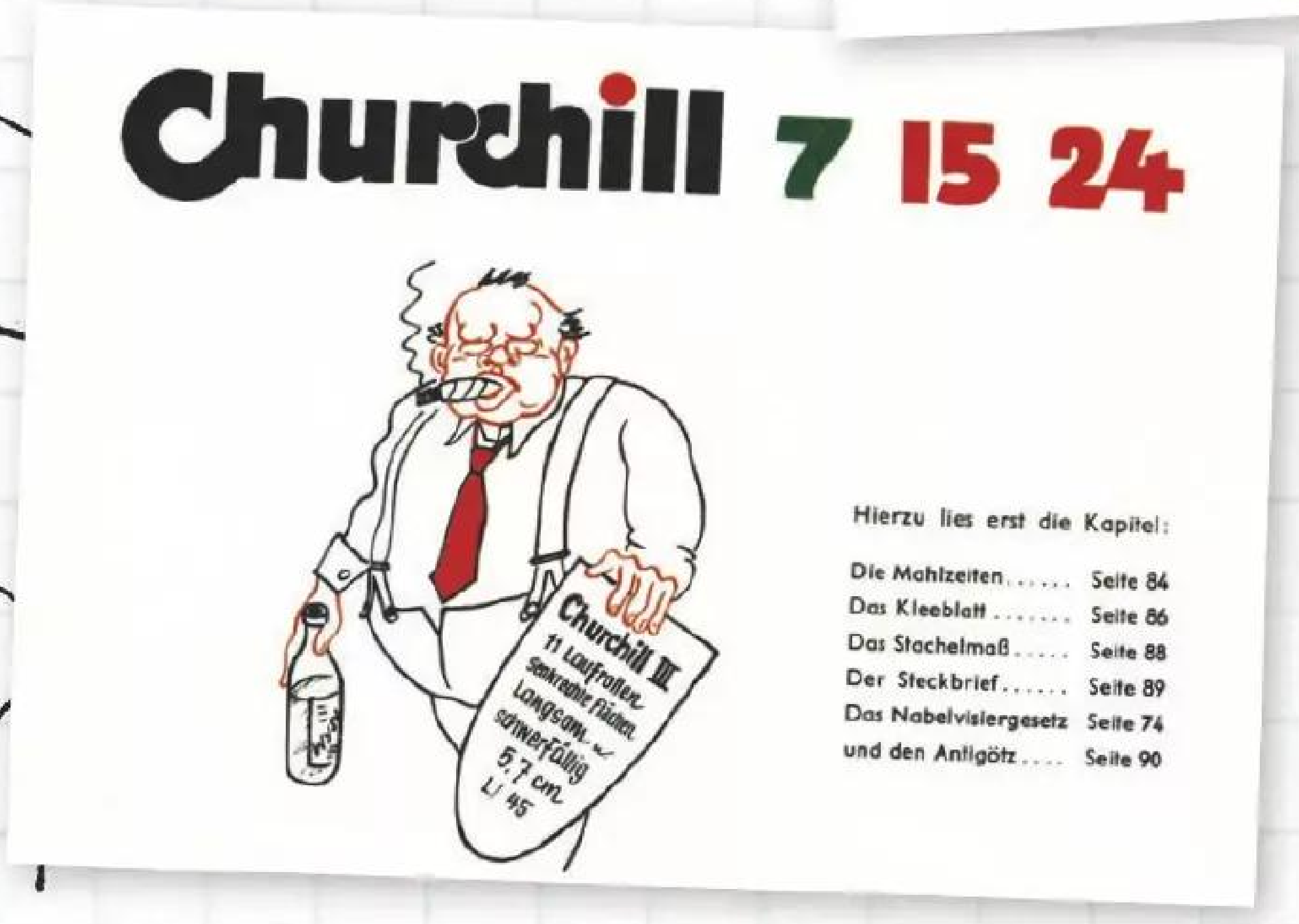
8: I can penetrate his front at 800 metres (rear and sides of all battle tanks at 2,000 metres).

43: I can penetrate his front at four strokes width (800 m) and side at three strokes width (2,000 m).

The clover leaf indicates the range where a T-34 can penetrate the Tiger's armour.



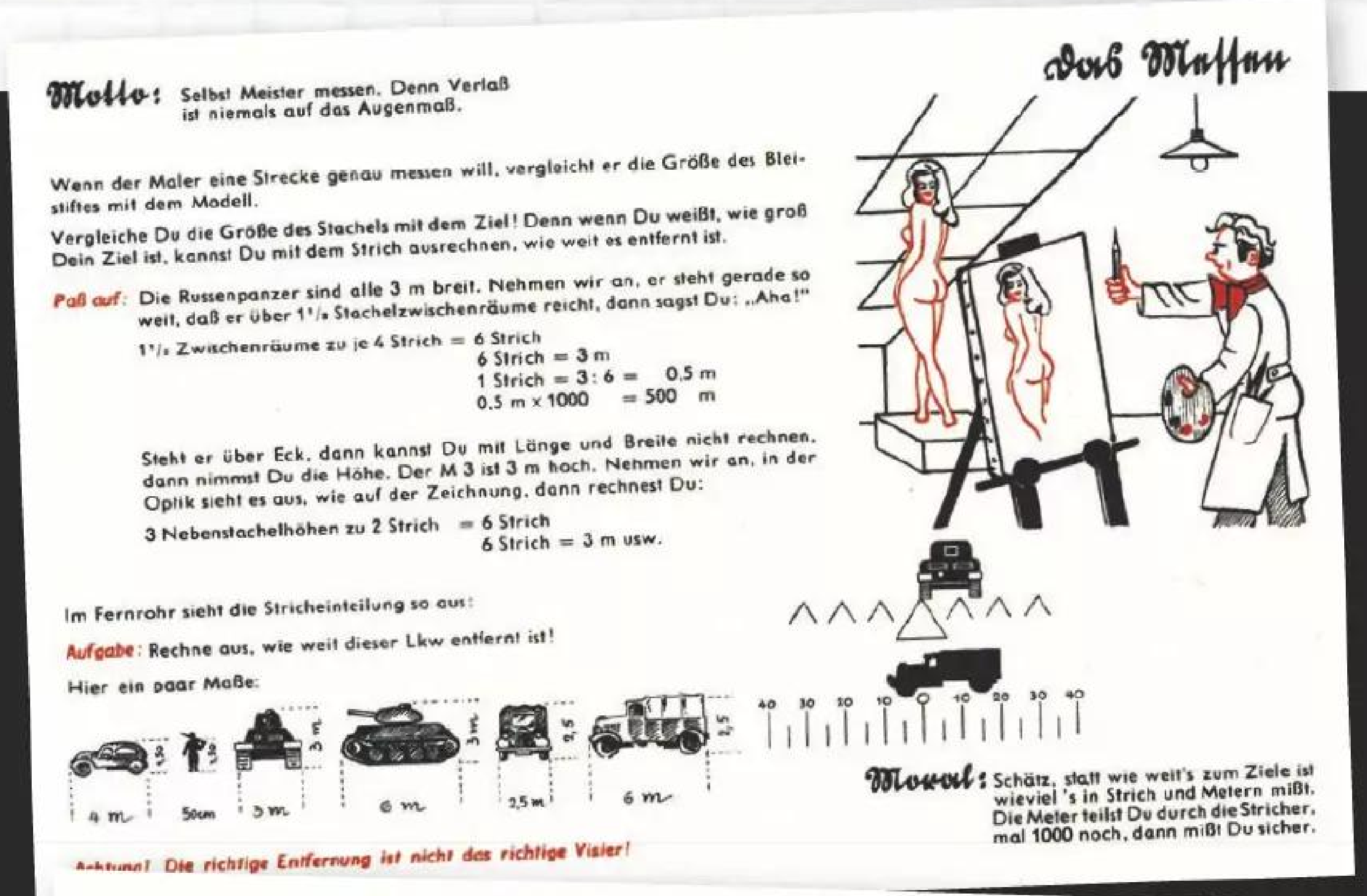




Hierzu lies erst die Kapitel:

Die Mahlzeiten ...... Seite 84
Das Kleeblatt .... Seite 86
Das Stachelmaß ..... Seite 88
Der Steckbrief ...... Seite 89
Das Nabelvisiergesetz Seite 74
und den Antigötz .... Seite 90

The front page of the appendices, which provide quick facts about each enemy tank and is adorned by a cartoon of an alcoholic Churchill.


Das Meſſen
40 30 20 10 0 10 20 30 40
4 m
50cm
3 m
6 m
2,5 m
6 m
3 m
2,5
2,5

Motto: Selbst Meister messen. Denn Verlaß ist niemals auf das Augenmaß.

Wenn der Maler eine Strecke genau messen will, vergleicht er die Größe des Bleistiftes mit dem Modell.

Vergleiche Du die Größe des Stachels mit dem Ziel! Denn wenn Du weißt, wie groß Dein Ziel ist, kannst Du mit dem Strich ausrechnen, wie weit es entfernt ist.

Paß auf: Die Russenpanzer sind alle 3 m breit. Nehmen wir an, er steht gerade so weit, daß er über 1½ Stachelzwischenräume reicht, dann sagst Du: „Aha!"

1½ Zwischenräume zu je 4 Strich = 6 Strich
6 Strich = 3 m
1 Strich = 3 : 6 = 0,5 m
0,5 m × 1000 = 500 m

Steht er über Eck, dann kannst Du mit Länge und Breite nicht rechnen, dann nimmst Du die Höhe. Der M 3 ist 3 m hoch. Nehmen wir an, in der Optik sieht es aus, wie auf der Zeichnung, dann rechnest Du:

3 Nebenstachelhöhen zu 2 Strich = 6 Strich
6 Strich = 3 m usw.

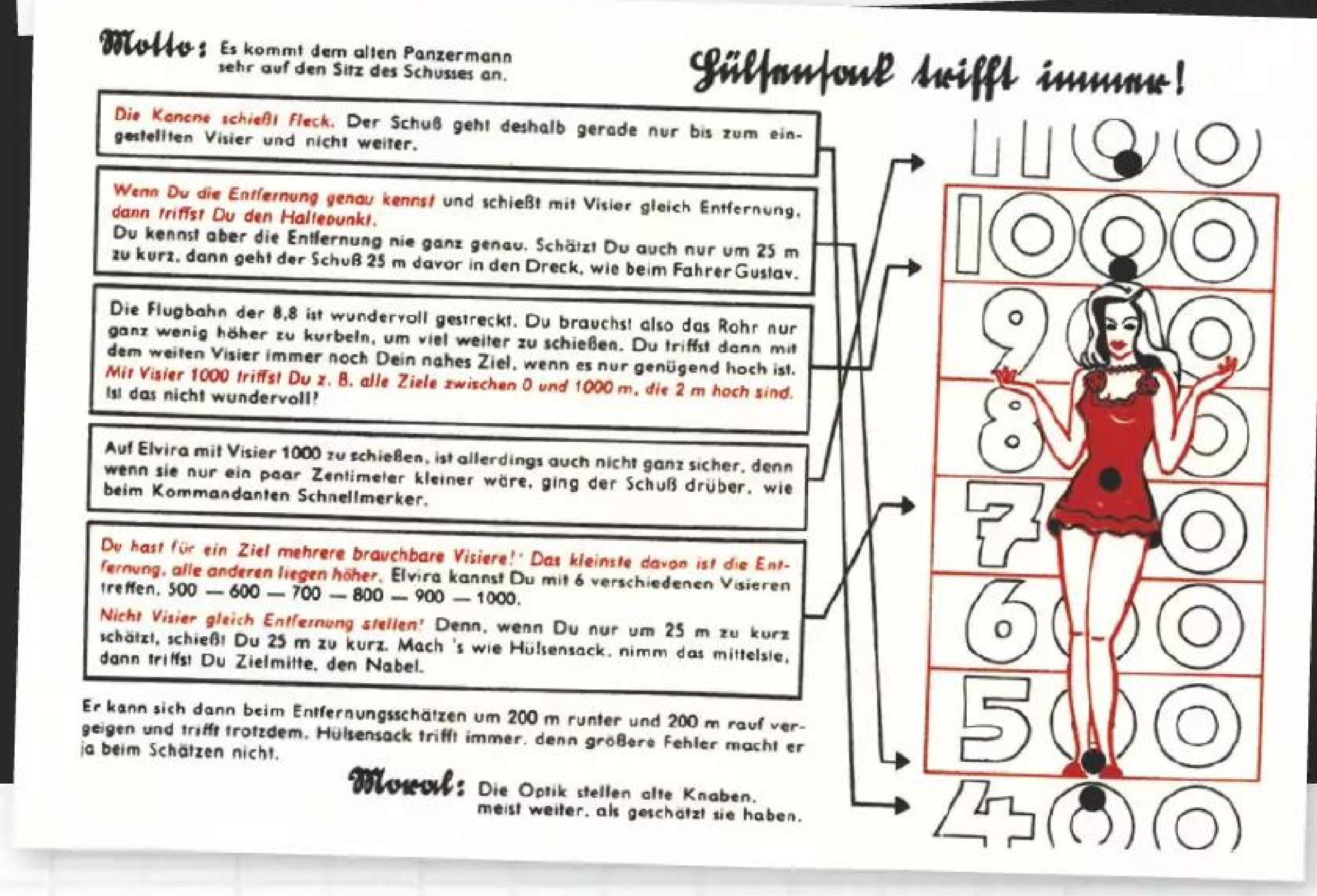
Im Fernrohr sieht die Stricheinteilung so aus:

Aufgabe: Rechne aus, wie weit dieser Lkw entfernt ist!

Hier ein paar Maße:

Moral: Schätz, statt wie weit's zum Ziele ist
wieviel 's in Strich und Metern mißt.
Die Meter teilst Du durch die Stricher,
mal 1000 noch, dann mißt Du sicher.

Achtung! Die richtige Entfernung ist nicht das richtige Visier!


Hülſenſack trifft immer!
1100
1000
900
800
700
600
500
400

Motto: Es kommt dem alten Panzermann sehr auf den Sitz des Schusses an.

Die Kanone schießt Fleck. Der Schuß geht deshalb gerade nur bis zum eingestellten Visier und nicht weiter.

Wenn Du die Entfernung genau kennst und schießt mit Visier gleich Entfernung, dann triffst Du den Haltepunkt.
Du kennst aber die Entfernung nie ganz genau. Schätzt Du auch nur um 25 m zu kurz, dann geht der Schuß 25 m davor in den Dreck, wie beim Fahrer Gustav.

Die Flugbahn der 8,8 ist wundervoll gestreckt. Du brauchst also das Rohr nur ganz wenig höher zu kurbeln, um viel weiter zu schießen. Du triffst dann mit dem weiten Visier immer noch Dein nahes Ziel, wenn es nur genügend hoch ist. Mit Visier 1000 triffst Du z. B. alle Ziele zwischen 0 und 1000 m, die 2 m hoch sind. Ist das nicht wundervoll!

Auf Elvira mit Visier 1000 zu schießen, ist allerdings auch nicht ganz sicher, denn wenn sie nur ein paar Zentimeter kleiner wäre, ging der Schuß drüber, wie beim Kommandanten Schnellmerker.

Du hast für ein Ziel mehrere brauchbare Visiere! Das kleinste davon ist die Entfernung, alle anderen liegen höher. Elvira kannst Du mit 6 verschiedenen Visieren treffen. 500 — 600 — 700 — 800 — 900 — 1000.

Nicht Visier gleich Entfernung stellen! Denn, wenn Du nur um 25 m zu kurz schätzt, schießt Du 25 m zu kurz. Mach 's wie Hülsensack, nimm das mittelste, dann triffst Du Zielmitte, den Nabel.

Er kann sich dann beim Entfernungsschätzen um 200 m runter und 200 m rauf vergeigen und trifft trotzdem. Hülsensack trifft immer, denn größere Fehler macht er ja beim Schätzen nicht.

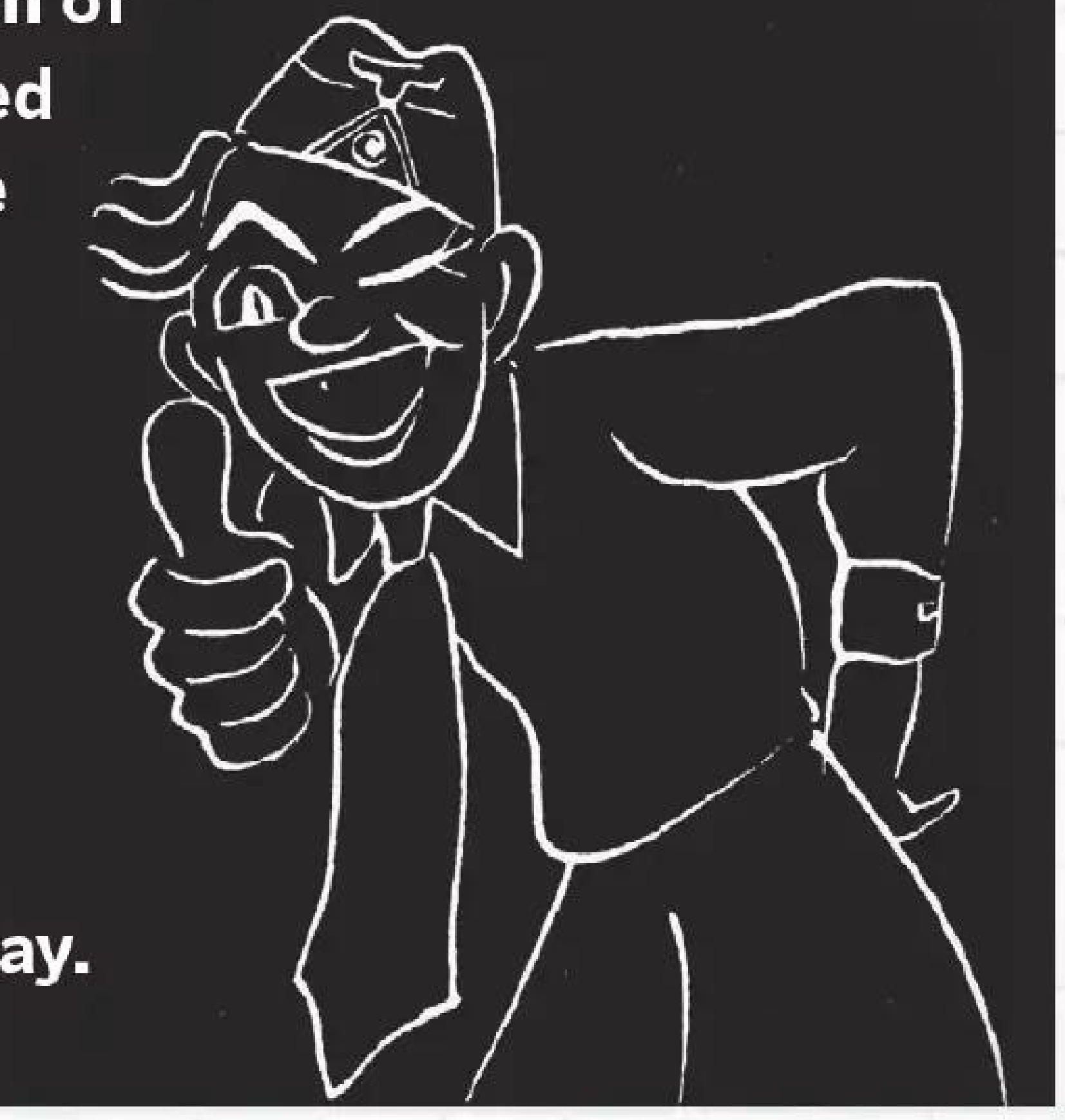
Moral: Die Optik stellen alte Knaben.
meist weiter, als geschätzt sie haben.

Gunner: Holzauge, the Infallible

★ The second longest chapter is "Holzauge, the Infallible". Topics discussed include estimations of distance, use of different weapons and ammunition, plus calculating and aiming at moving targets.

The upper page reminds the gunner of the painter's method for calculating distance: the target's width in metres is divided by the width of the gaps measured, multiplied by 1,000 to give the distance in metres.

The bottom page points out that the gun's flat-projectile trajectory means that if you set your range to 1,000 metres, all 2-m-high targets will be hit – even if they're less than 1,000 m away.



THE DAYS AFTER

The day after the world's biggest landing operation, the Allies immediately set their sights on the invasion's next target: US, British and Canadian soldiers are to expand the bridgehead and occupy Normandy's key ports and fortified towns. But despite superior equipment and almost complete air supremacy, the Allies are forced to fight fiercely against resolute German panzer troops before they can strengthen their tenuous foothold on the European continent. Even then, the advance in Normandy doesn't always go according to plan.

1944

7th June The Allies start fighting to expand their bridgehead.

10th June Montgomery approaches Caen.

13th June Fierce tank battles at Villers-Bocage end with a British withdrawal.

29th June US troops occupy the key port of Cherbourg.

30th June Operation Epsom flops When 60,000 British troops fail to capture Caen.

1944

Something was wrong, but Lieutenant Waverly Wray couldn't put his finger on what it was. Dawn was just about to break at 05.10 on 7th June, 1944. Wray stared into the darkness as he tried to sense what he couldn't see. The US soldier stood on the outskirts of the village of Sainte-Mère-Église along with around 600 other lightly armed paratroopers. 28 hours ago, he'd hung by parachute in the air over Normandy's dark landscape as part of the vanguard for one of the most difficult and complicated military operations ever: the invasion of Normandy.

Dawn in enemy territory

Over the following day that Wray had been in France, the Allies had put 175,000 men ashore and pushed the German soldiers away from the coast. Now, a day later, British, Canadian and American soldiers woke up along the Normandy coast after spending the night in self-dug foxholes or sitting on the ground back-to-back with their colleagues.

D-Day was already history. The soldiers had survived the capture of the beaches and helped establish a bridgehead; now it was time to expand it. The Allies hadn't penetrated as far inland on D-Day as planned, and in front of them, the Wehrmacht's mighty war machine was lying in wait.

There would be a German counteroffensive – everyone expected it. The Germans had to push the Allies back into the sea at all costs if they were to win the war. And this morning on the outskirts of Sainte-Mère-Église, Lieutenant Wray sensed that the counterattack was brewing right in front of him.

> "Their road will be long and hard", said President Roosevelt with meaning in an evening prayer on 6th June.

Hugely outnumbered

Wray was right. 6,000 German soldiers were preparing to break through the Allied lines. Wray was no novice – he was a veteran of the fighting in Sicily and Italy, and his regimental commander Colonel Ben Vandervoort described him "as experienced and skilled as an infantry soldier can get and still be alive". He weighed 114 kg (250 lbs), with "legs like tree trunks" and hailed from Batesville, Mississippi. Wray was not your regular solider – as a Baptist he was a non-smoker, non-drinker and never swore. The paratrooper could hear the distant sound of soldiers and vehicles north of the village in the morning gloom and immediately reported to Vandervoort what he'd heard – and where he believed the enemy would attack. His commander listened, then ordered Wray to attack the German flank with his company. As the men prepared themselves, the Baptist picked up his weapons and left to perform his own reconnaissance and plan his attack.

Wray walked along sunken roads edged by trees and shrubs, and then passed through an orchard while he noted various German positions. He was used to moving in woodland, and his good sense of direction helped him navigate the labyrinthine hedges. Suddenly he heard voices from the other side of the hedge where he stood. It sounded like a discussion over map coordinates. Wray raised his weapon, burst through the hedge and yelled in German: "Hands up!" Seven of the eight German officers obeyed. The last one reached for his weapon, and Wray shot him. But then he himself was shot. 100 metres behind him lay a slit trench from where two German soldiers peppered him with machine gun bullets – one flew close enough to tear off half his right ear. The seven officers started to run, so Wray dropped to one knee, fired a single shot at each, killing them on the spot, and then turned around. With a new magazine fitted to his M1 Garand semi-automatic rifle, he then shot both German snipers – again with one shot through each's head.

The following day, Wray accompanied his commanders back to the spot to see who he had shot. During the night, the apple trees had sprinkled white blossom over the German officers' bodies. They were identified as the commander and staff of the 1st Battalion, 158th Grenadier Infantry Regiment. They should have been part of the vanguard as part of the German's planned counterattack, but which had ended in confusion, partly thanks to Lieutenant Wray's one-man mission.

Death came from the air

Already by dawn, as Wray was shooting the officers, both the Wehrmacht and Allies

The Desert Rats were deployed during the fighting in Normandy.

American forces land on Omaha Beach in the days following D-Day before advancing into Normandy.

“Wray raised his weapon, burst through the hedge and yelled in German: “Hands up””

were in the process of sending reinforcements to the front. The Germans lacked the same level of planning as the Allies for deploying their forces, and both British and US air forces ensured the Germans couldn’t easily reach the front line. The rail network had been thoroughly bombed before the invasion, and those troops sent to the front by the Germans were so savagely attacked by aircraft that they could only move at night or when heavily camouflaged.

Days where there was rain, fog or dark clouds became the Germans’ favourites because they prevented air attacks. The Allies had effortlessly secured supremacy in the air, and the Luftwaffe rarely appeared. This gave the Allies a huge advantage: not only could they bomb German transports, they could also fly in supplies and deploy reconnaissance aircraft to direct their artillery. The Germans quickly learned to stop firing to avoid discovery when they saw a reconnaissance plane in the sky.

Sergeant Günter Behr was a radio operator with a German battery that had lost two guns to shelling. “As soon as we fired our guns, we had to run again, and look for a good place to hide,” he related. “We were hunted. Always afraid. If you could not run, it was over. Like eagles and rabbits.”

Germans clung to Caen

Despite their dominance in the air, the Allies didn’t move quickly enough. There were particular problems in the British sector. The invasion forces on Sword Beach were supposed to have captured Caen on D-Day itself but failed to do so.

“We can always take it tomorrow,” said British commanders. What they didn’t anticipate was that fighting for Caen would become a long and ►

drawn-out battle between the bulk of the German armoured forces and British and Canadian forces.

On the other hand, Bayeux was easily captured on the day after D-Day as the city had been largely evacuated in advance. Caen was strongly defended, however. The Allies tried take the city with a frontal assault, but even after a powerful naval bombardment, the Germans refused to budge. A British anti-tank division was captured when it was unable to ascertain its position due to the gun smoke. Their German captors proved both nonchalant and "elegant" and offered the prisoners milk or wine to drink. At that moment, shells from *HMS Warspite* started to fly overhead.

"I think we better dig a hole, don't you?" One German said to his prisoner, a British lieutenant. As the bombardment continued, they sat side-by-side in the trench, sharing pictures of their loved ones and cowering each time a shell flew past.

"You will be back in the sea in a few days," the German said.

"No, I am sorry," the lieutenant replied. "We will be in Paris in a week."

The battles for Normandy became intense and even merciless, with soldiers taking reprisals by shooting wounded enemies at close range. Others were ordered to avoid taking any prisoners.

Over the next few days – 7th-9th June – the Allies around Caen advanced village by village while the Germans fought back and constantly reinforced the front with armoured troops trying to prepare for a counterattack on the coast.

COUNTERATTACK THWARTED

Neither side was able to force a breakthrough. Therefore, General Geyr von Schweppenburg, who commanded the German 5th Panzer Army on the Western Front, started planning a large-scale offensive against the Allies for dusk on 10th June. After personally witnessing the RAF bomb the "Hitlerjugend" panzer division sent to defend Caen, he and Field Marshal Erwin Rommel decided that the attack would take place at night.

But 16 British tanks suddenly broke through the German lines, and squadrons of British aircraft appeared in the sky and blasted Geyr's command post to pieces. He survived, but his chief-of-staff, virtually all the personnel in the command post and many officers died in the attack. Geyr was left shell-shocked and unable to resume his command for several weeks.

Allied tanks roar through the war-torn commune of La Délivrande, just 14 kilometres north of Caen.

BRITISH STALLED

Instead of a large-scale counterattack, the Germans had to divide up their armoured troops to hold the front. But they remained strong enough to prevent the British taking Caen immediately. And the city was important: if the Allies didn't capture Caen, they couldn't extend the bridgehead, which was still so narrow there was little room in the British sector for airfields, workshops, camps, field hospitals and vehicles.

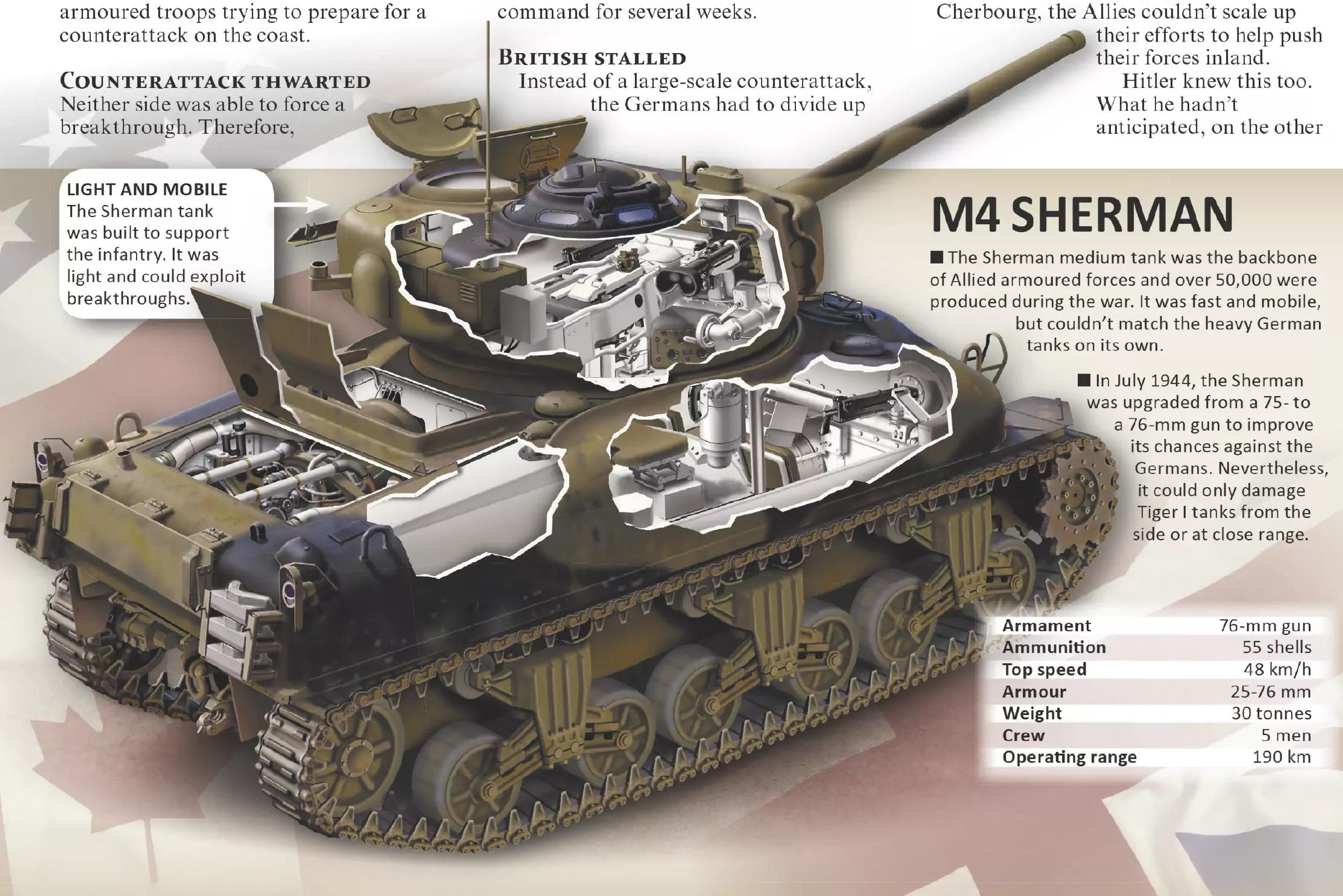
Moreover, it was increasingly problematic for the British to receive the many soldiers earmarked to land during the construction of the invasion force in Normandy.

The bridgehead had to be expanded around Caen, with the city now the military pivot on which the entire invasion could turn. Caen was a vitally strategic goal if the Allies were to continue to Paris. But Caen had developed into a stalemate, with the British fearing they wouldn't be able to win what had turned into a drawn-out struggle.

PORTS WERE VITAL

While the British and Canadians strove against the Wehrmacht's powerful armoured forces at Caen, those Americans on their western flank advanced towards the French port of Cherbourg on the Cotentin Peninsula. The port was extremely important for landing reinforcements and supplies. The Allied soldiers needed radio equipment and rations, Jeeps and ammunition, fuel and small arms, typewriters and forms. Without control of large ports like Cherbourg, the Allies couldn't scale up their efforts to help push their forces inland.

Hitler knew this too. What he hadn't anticipated, on the other



LIGHT AND MOBILE
The Sherman tank was built to support the infantry. It was light and could exploit breakthroughs.

M4 SHERMAN

- The Sherman medium tank was the backbone of Allied armoured forces and over 50,000 were produced during the war. It was fast and mobile, but couldn't match the heavy German tanks on its own.
- In July 1944, the Sherman was upgraded from a 75- to a 76-mm gun to improve its chances against the Germans. Nevertheless, it could only damage Tiger I tanks from the side or at close range.

Armament	76-mm gun
Ammunition	55 shells
Top speed	48 km/h
Armour	25-76 mm
Weight	30 tonnes
Crew	5 men
Operating range	190 km

MICHAEL WITTMANN *1914-1944*

PANZER ACE

■ German SS captain and tank commander Michael Wittmann enlisted in the German army at the age of 20 in 1934. By the time he transferred to Normandy in April 1944 he was already a celebrity because he'd destroyed 137 tanks on the Eastern Front. Wittmann was furious with the Allies because they'd bombed German cities, and he said to his soldiers: "We have only one watchword and that is 'revenge'!" He achieved retribution on 13th June in the Battle of Villers-Bocage, where in under 15 minutes his battalion destroyed around 13 tanks, several anti-tank guns and many armoured cars. His efforts saw him promoted to SS captain, but the title lasted only a few months until his death on 8th August, 1944. Wittman fell in battle near Saint-Aignan-de-Cramesnil when his tank was hit and destroyed, probably by a British Sherman tank.

Over 100 tank 'kills' on the Eastern Front – received Iron Cross from Hitler – died on the battlefield

hand, was that the US and Britain had jointly developed and built huge landing craft – LSTs (Landing Ship, Tanks) – that weren't reliant on harbours – they could deliver troops, large vehicles, artillery and more via the beaches before any of the ports were captured.

"Jeeps bearing staff officers were as common as yellow cabs in the heart of New York," a US naval officer said of the beach at Omaha, which he compared to "Coney Island on a hot Sunday".

BATTLED HEDGE TO HEDGE

However helpful, the LSTs weren't enough on their own, and Cherbourg remained a key target. But the advancing Americans soon encountered an unexpected obstacle in the form of the French hedges. The Normandy hedges were deeply rooted in history. Since Roman times, farmers had built earth embankments several metres high to enclose cattle inside.

Sunken roads led between the hedges while at the top of the embankment, trees were planted that spread their branches over the top of the roads to form tunnels.

"The roads themselves, shut in by clay banks in this melancholy way, are not unlike the moats of fortresses," wrote French author Honoré de Balzac's 100 years earlier. Unfortunately, the Allies had not done their homework properly. They'd seen the embankments in aerial photos, but assumed they were no higher than traditional British hedges – small enough for fox hunters' horses to jump.

Normandy's huge hedges enclosed each field, and often had just one gap in which to enter or exit, which the Germans covered with artillery. The roads between the hedges provided soldiers with no view – there were leaves, branches and foliage no matter where their eyes turned. The soldiers hated it. At the same time, the hedges simplified the military strategic nature of the fighting. Normandy's hedges provided excellent defensive opportunities for the Germans while the Allies had very specific objectives: capture the next hedge, the next field, the next village.

> "When you are under its fire you are the sole target. All of that shrieking, whining venom is directed at you and at no-one else."

US GENERAL LED THE WAY

Normandy was also home to French stone houses. Their thick walls made them as solid as bunkers, and if Germans entrenched themselves in such a house, many soldiers had no idea what to do.

The day after D-Day, General Norman Cota passed by a group of infantrymen who were taking cover while Germans shot at them from a farmhouse. Why, he demanded, had the soldiers not tried to take it?

"Sir, the Germans are in there, shooting at us," replied their commanding officer.

"Well, I'll tell you what, captain," Cota replied. "You and your men start shooting at them. I'll take a squad of men and you and your men watch carefully. I'll show you how to take a house with Germans in it."

Cota moved with his group as close to the house as possible until he cried loudly and charged forward at the head of the group. His men kicked down the door and threw hand grenades through the windows and doorway. After the explosions, the surviving Germans fled.

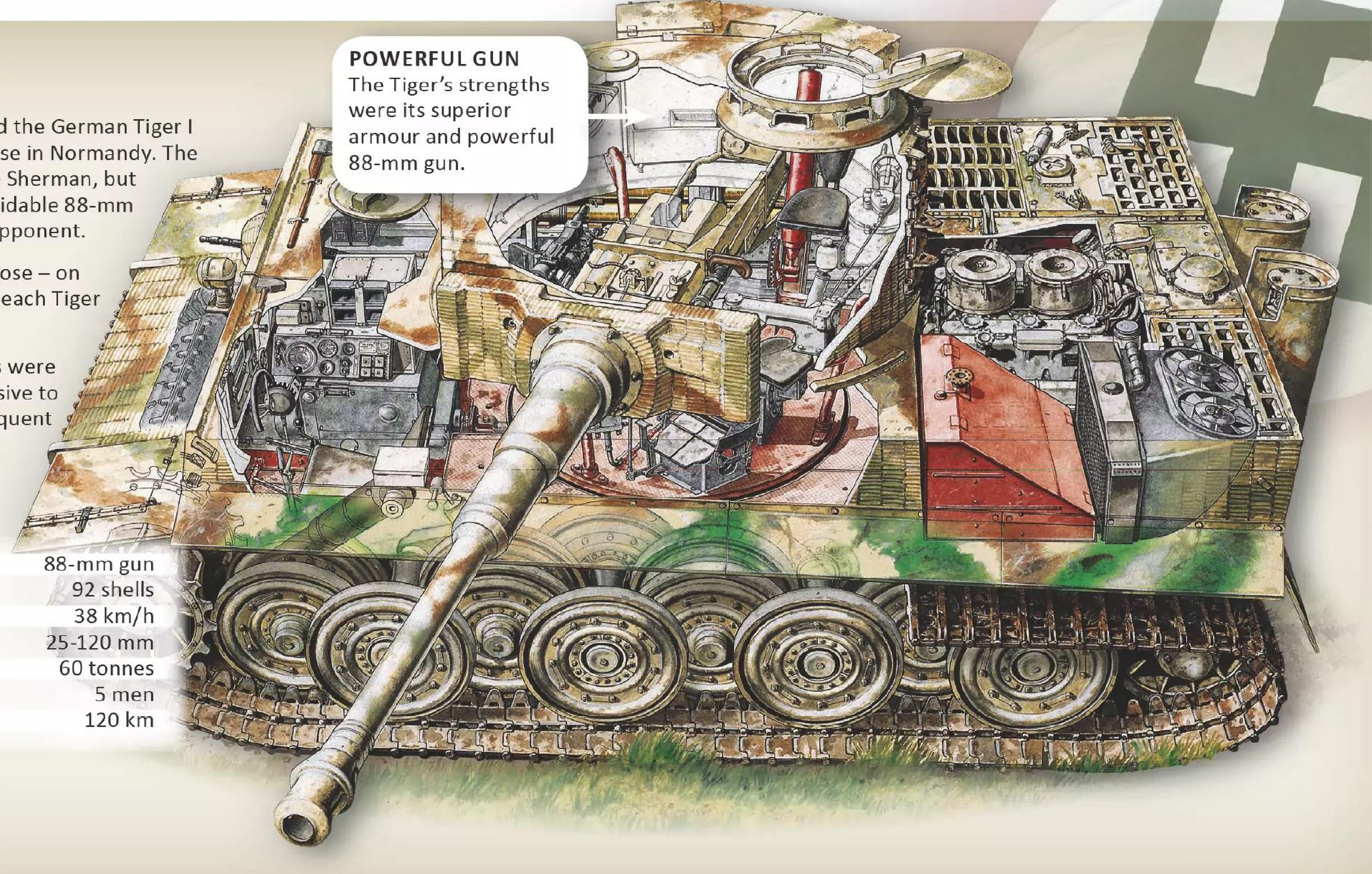
"You've seen how to take a house," Cota said when he next stood next to the captain. He was confident the story would quickly ►

TIGER 1

■ Allied tank crews feared the German Tiger I heavy tank like nothing else in Normandy. The Tiger was slower than the Sherman, but its thick armour and formidable 88-mm gun made it a terrifying opponent.

■ The Allies expected to lose – on average – three tanks for each Tiger they knocked out.

■ Only 1,350 Tiger I tanks were built, as they were expensive to produce and suffered frequent mechanical failures.



POWERFUL GUN
The Tiger's strengths were its superior armour and powerful 88-mm gun.

Armament	88-mm gun
Ammunition	92 shells
Top speed	38 km/h
Armour	25-120 mm
Weight	60 tonnes
Crew	5 men
Operating range	120 km

"The fighting in the west has now begun... We have stepped up to the highest battle."

circulate the division so the other soldiers would hear it. For though the men had been trained for the invasion, much remained to be learned during those first hours and days after their arrival in Normandy.

Elite troops disappointed

Field Marshal Bernard Montgomery also learned a lesson that forced him to switch tactics if he hoped to take Caen. On 10th June, Montgomery met Generals Miles Dempsey and Omar Bradley (US) in a field at Port-en-Bessin between Omaha and Gold Beaches, where the British and Americans had closed the gap between the beaches. They spread out a map on the bonnet of the car, and Montgomery explained that the British and Canadians would make a pincer movement: the 51st (Highland) Division would move east of Caen to attack from Cagny while his 'Desert Rats', the 7th Armoured Division, would attack from the left via the American flank near Tilly-sur-Seulles. The Desert Rats had fought in North Africa earlier in the war for Montgomery, as had the 51st Highland Division, and he considered them his two best cards.

61,732
Allied soldiers were killed, wounded or missing in Normandy in late June.

But it had been a long way from the Desert War to the fronts of Normandy. The 51st hadn't even come close to reaching Cagny before being stopped by German battlegroups and armoured forces. They were able, however, to meet up with the Allied paratroopers who'd been fighting at the Orne River despite being outnumbered.

The 51st were caught out by the German tactics: small, sharp actions followed by concentrated artillery bombardments. One Highlander described it thus: "The fury of artillery is a cold, mechanical fury, but its intent is personal. When you are under its fire you are the sole target. All of that shrieking, whining venom is directed at you and at no-one else."

Both regular soldiers and their commanders were mentally broken within hours, and the paratroopers at Orne couldn't believe their own eyes when they saw the trained, experienced Highlanders in action.

Montgomery's elite troops were not as hardened as expected, and the idea that the 51st (Highland) Division could reach Cagny to play their part in a major attack on Caen was quietly forgotten.

Tigers lurked in ambush

On the other flank, the 7th Armoured Division's commander, Major General George Erskine, led an advance towards the village of Villers-Bocage. Erskine deployed his best reconnaissance unit on his flank instead of keeping them in front, as he had been told.

It would prove to be a mistake that led to the most devastating ambush in British military history. Things started favourably enough. The division's 22nd Armoured Brigade made surprisingly easy progress to Villers-Bocage. The small town was an important strategic target and its French residents were thrilled when the Allies rolled through the streets on 13th June at 08.00. They threw flowers on to the tanks and offered the soldiers butter and cider brandy.

North-east of the town lay a hill, which the Allies had named Hill 213, and holding this was critical to controlling the town. When a German armoured car was spotted in the vicinity, Lieutenant Colonel Arthur, Viscount Cranley, who commanded the 4th Company of London Yeomanry (Sharpshooters), sent "A" Squadron forward while commandeering a scout car to take a closer look at Hill 213.

But five German Tiger I tanks lay hidden in a small forest nearby. The Germans knew there was a hole in their lines and had sent reinforcements to close it. Legendary panzer commander Michael Wittmann and his five Tigers formed the vanguard, and when he saw "A" Squadron in front of him, he didn't take the time to appraise the situation. Instead, he swung out of the forest and, one by one, he blasted the British tanks with his powerful 88-mm gun.

The British tank column was left in chaos, and Wittmann left them to attack Villers-Bocage on his own. He drove confidently down the main street, first targeting the 4th Company's command post and then moving on to "B" Squadron. They were caught by surprise; many of the men were not in their tanks or ready for battle, and those who could were frustrated by how little damage their Cromwell tanks inflicted on the superior German Tiger.

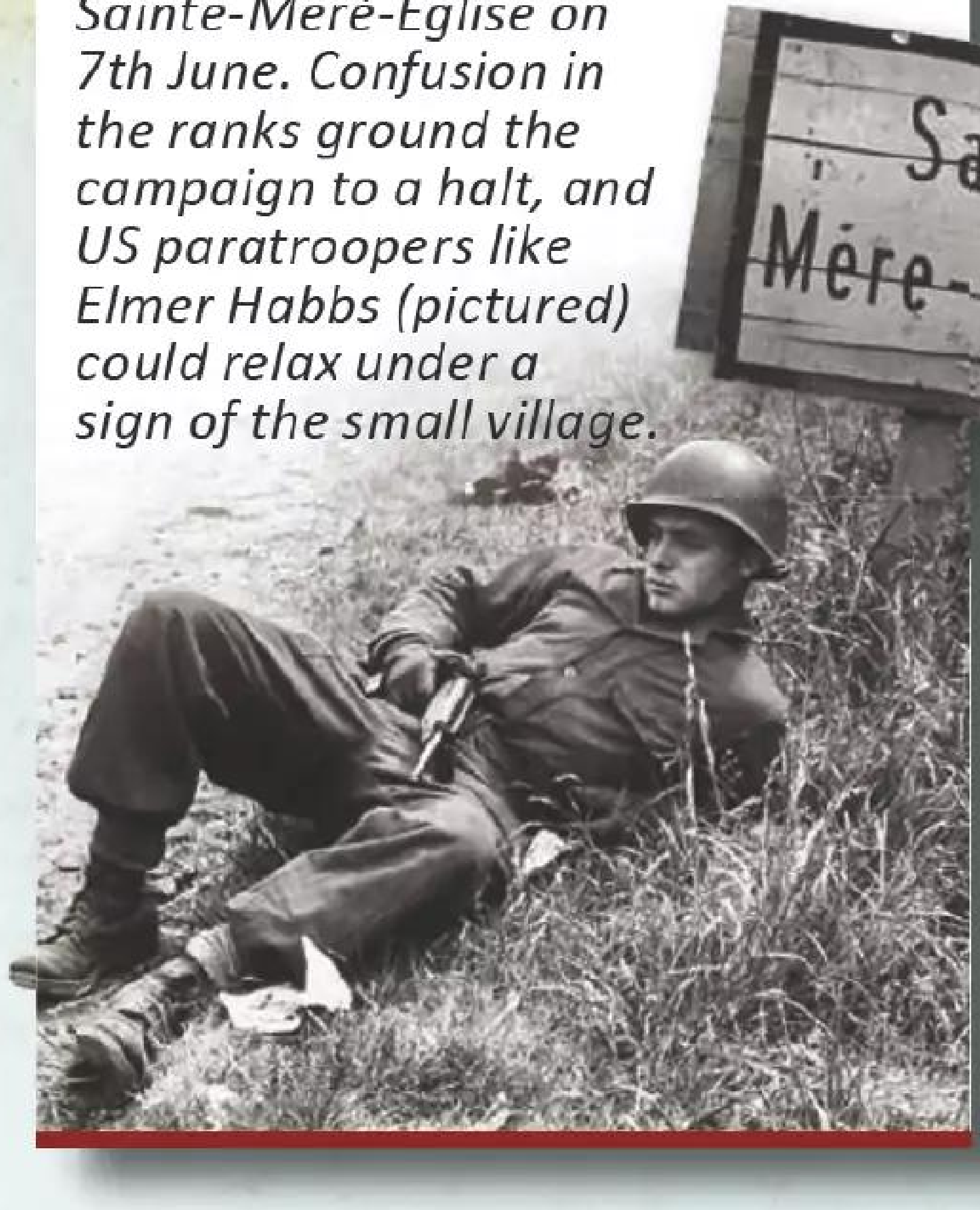
Wittmann left town but then returned later that afternoon with tanks from the 2nd Panzer Division. By then, however, the 22nd Armoured Brigade was ready and waiting for him. Despite a fierce barrage, the Allies managed to repel the attack. But Erskine was left shaken; instead of

Cherbourg

GERMANS DESTROY THE HARBOUR

■ Cherbourg was one of Normandy's key deep-water ports, and Hitler ordered the city to defend itself to the last man. When the Americans defeated the defenders in late June, the Germans had already blown the harbour to pieces.

COUNTERATTACK FAILS



■ 6,000 Germans prepared for their first major counterattack at Sainte-Merè-Eglise on 7th June. Confusion in the ranks ground the campaign to a halt, and US paratroopers like Elmer Habbs (pictured) could relax under a sign of the small village.

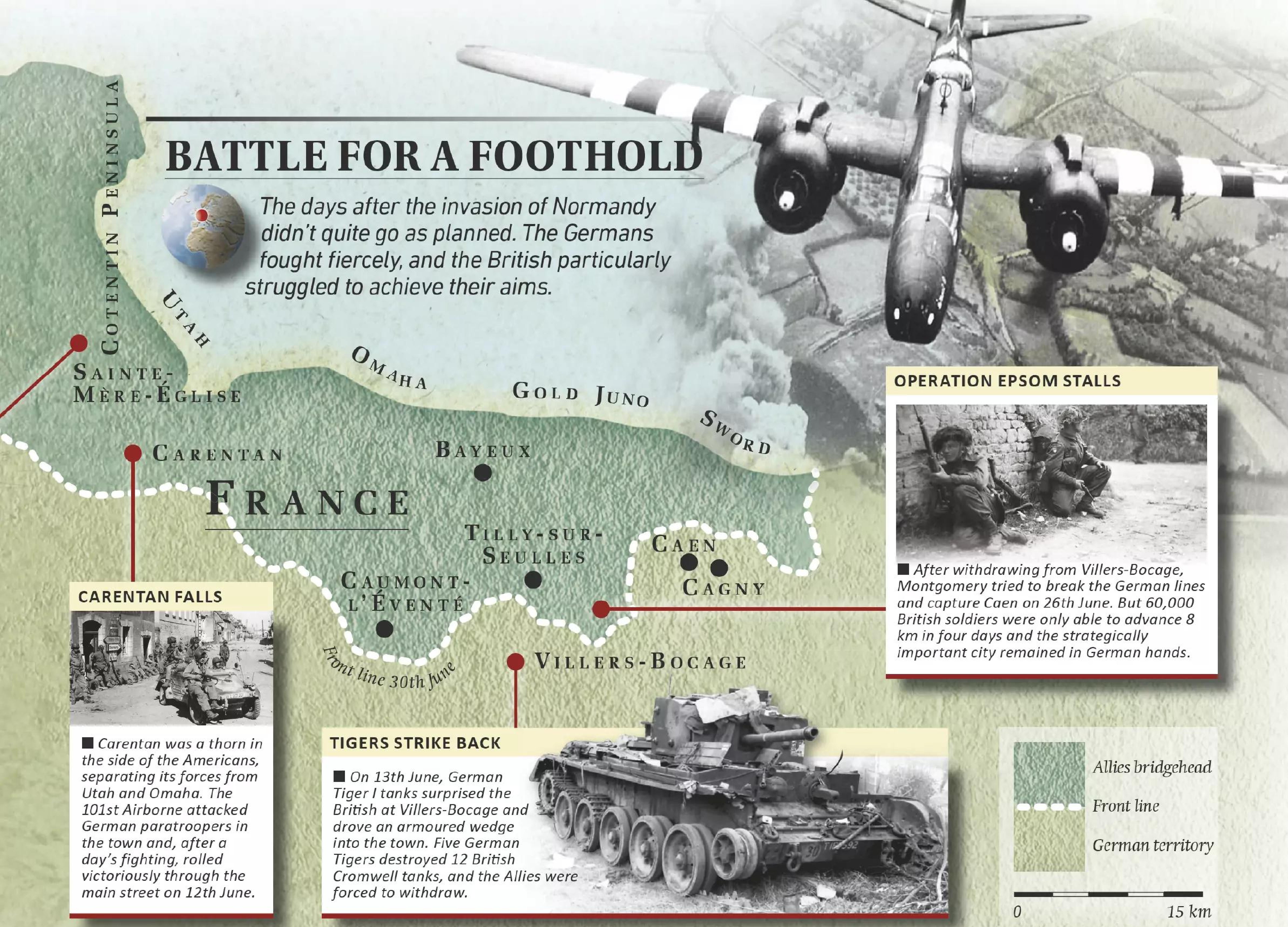
TECHNOLOGY............ CULTURE............ ECONOMY...... EVERYDAY......

Storm hit the Mulberry ports

On 19th June, the worst storm in 40 years struck the Normandy coast. The two artificial Mulberry ports, which had been towed over the Channel to help with the fast unloading of ships at the beaches, were severely damaged, and reinforcements and supplies were delayed for weeks. There was one bright spot, though: if D-day had been postponed for 14 days (as proposed just before the landing), the invasion fleet would have sailed directly into the storm.

BATTLE FOR A FOOTHOLD

The days after the invasion of Normandy didn't quite go as planned. The Germans fought fiercely, and the British particularly struggled to achieve their aims.



OPERATION EPSOM STALLS

■ After withdrawing from Villers-Bocage, Montgomery tried to break the German lines and capture Caen on 26th June. But 60,000 British soldiers were only able to advance 8 km in four days and the strategically important city remained in German hands.

CARENTAN FALLS

■ Carentan was a thorn in the side of the Americans, separating its forces from Utah and Omaha. The 101st Airborne attacked German paratroopers in the town and, after a day's fighting, rolled victoriously through the main street on 12th June.

TIGERS STRIKE BACK

■ On 13th June, German Tiger I tanks surprised the British at Villers-Bocage and drove an armoured wedge into the town. Five German Tigers destroyed 12 British Cromwell tanks, and the Allies were forced to withdraw.

reinforcing the brigade in Villers-Bocage, he decided to withdraw his forces while at the same time the German panzer division attacked at any possible opportunity. Meanwhile, the RAF virtually levelled Villers-Bocage that night. The town's inhabitants, who'd earlier welcomed their British liberators so lavishly, were now either dead, wounded or in flight.

Montgomery had difficulty admitting that everything didn't go as planned in Normandy. Even after the strategic disaster at Villers-Bocage, he wrote to Churchill that: "Battle is going well at junction of the two armies in the general area Caumont-Villers-Bocage-Tilly."

An even larger attack was planned, this time under the name Operation Epsom with 60,000 men. But this too failed, and it appeared Caen would be the British Achilles' heel.

CHERBOURG WAS TAKEN

While the German panzers were engaged on the British front, US forces advanced towards Cherbourg. Despite their struggles with working through the hedges and stone houses, the Americans made rapid progress. Over the space of four days, the 9th Infantry and 82nd Airborne Divisions pushed across the Cotentin Peninsula and effectively cut it off from the Germans. On 22nd June, the US launched a fierce bombardment of Cherbourg. The town's sirens rang, and the German soldiers ran to man their positions.

Many were German teenagers employed in construction because they'd yet to finish training as soldiers. Eventually, Generalleutnant Karl-Wilhelm von Schlieben, Cherbourg's new commandant, realised the battle was lost. "Final battle for Cherbourg has begun," a staff officer reported over the radio on 25th June. "General takes part in fighting. Long live the Führer and Germany".

When the Americans finally reached Cherbourg and had overcome any remaining small pockets of resistance, they discovered the harbour had been destroyed by German engineering troops. It would take weeks to repair before the Allies could use it to receive supplies and troops.

German SS panzer forces wore short uniform jackets to provide both warmth and free movement in the cramped tanks.

THE BEGINNING OF THE END

Despite the port's destruction, the fall of Cherbourg was an important step in the struggle to gain a foothold on the European continent. Although the bridgeheads hadn't been as expanded as much as hoped, the Allies hadn't stalled – they'd made progress and the German Reich was faltering.

The seriousness of the situation was clear to a German panzer officer who, in the middle of the battle for the Normandy, took the time to send a letter home:

"The fighting in the west has now begun. You can imagine how much we are needed and that little time is left for writing. It is all or nothing now, it is about the existence or the end of our beloved Fatherland… We have stepped up to the highest battle."

Stalin's best marshal

At the height of his career he was **hated, feared and admired.** Then he was pushed away and ignored. Today, Stalin's foremost marshal, Georgy K Zhukov, is once again hailed as a hero in Russia.

TEXT: **NICLAS SENNERTEG**

It was almost as though he'd never existed. Just as when revolutionary hero Leon Trotsky disappeared from Soviet history books during the Stalin era, so too did the authorities attempt to eliminate the country's war hero from official histories in the 1960s. The Soviet Union's ability to make non-desirables invisible was so great that not even the Soviet international news agency Novosti knew where to find him.

After some thought, somebody remembered that one of the marshal's daughters might work for a radio station. She in turn steered the journalist to Sosnovka-5, Kuntsevo, an address in a Moscow suburb. Here lay a relatively large state dacha that only a handful of people knew about. Stalin had lent the property to Zhukov for life, and all its furnishings were state property that would have to be returned after the marshal's death.

Here the ageing, forcibly retired marshal lived, cut off from friends and colleagues who no longer dared visit him. The changing political winds under Khrushchev meant Zhukov's name was best not mentioned – it was even occasionally omitted from historical depictions of the battles he'd led.

When Novosti finally found him, the official cold around Zhukov had begun to thaw and it was possible to ask the marshal to write down his memoirs about the eventful life he'd led.

When Georgy Konstantinovich Zhukov was born in Tsarist Russia on 1st December, 1896, there was nothing that suggested the poor boy would become one of the country's most legendary army commanders. His parents in the small town of Strelkovka in the Kaluga Province sent him to a Christian primary school, and from there he was sent to his uncle in Moscow as an apprentice furrier. At the age of 15, he also took further school exams after evening classes, something unusual for a poor boy from the country.

In 1915, one year after the outbreak of WWI, Zhukov was conscripted into the cavalry as a reconnaissance solider. During the war he advanced to non-commissioned officer and was dedicated twice with the Cross of St George. Just before the October Revolution in 1917, Zhukov found himself back in his home village where he was convalescing after falling dangerously ill from typhus. It wasn't until summer 1918 that he completely recovered and joined the newly established Red Army. It was primarily defending the young Soviet Union against the 'White' Army, which aimed to overthrow the Bolsheviks in ►

Zhukov was decorated four times with the Hero of the Soviet Union medal.

Georgy Konstantinovich Zhukov was considered the Soviet Union's foremost strategist during World War II. This picture is from around 1940.

> **"Nothing... suggested the poor boy would become one of the country's most legendary army commanders"**

POPPERFOTO/GETTY

Red Army forces under Zhukov's command defeated the Japanese 6th Army in the Battle of Khalkhin Gol, Mongolia in August 1939.

favour of reintroducing the hated Tsarist regime or a parliamentary system of government.

During this bloody civil war Zhukov continued his military career as a soldier, but rose dramatically through the ranks and was in command of a squadron by 1919. The same year he was wounded in the fighting at Tsaritsyn, a city that around 20 years later would become known the world over as Stalingrad.

After the war, Zhukov continued his career in the Red Army. In the 1920s and 1930s he continued to rise steadily through the ranks. In 1933 he was given command of his own cavalry division: he admitted he was "preoccupied with one thought only: to make my division the best outfit in the Red Army". He was successful, which led to the Order of Lenin and – in 1937 – he was promoted to commander of the 3rd Cavalry Corps. By now he'd made his mark as an incredibly knowledgeable and energetic commander who laid great emphasis on tactical education for his officers and physical training for his troops. He also showed great understanding for the potential of mechanised warfare.

At the same time, several negative qualities also appeared. These were to dog him during World War II. His chief, Marshal Semyon Budyonny, believed in the early 1930s that Zhukov was "unnecessarily harsh and rude". Former classmate (and future marshal) Konstantin Rokossovsky noted at the time that Zhukov was "painfully proud". Even though he was an orthodox communist, he often ended up on a collision course with political officers.

In his memoirs, Zhukov acknowledged his weaknesses, but defended them at the same time:

"I was said to have been unnecessarily exacting – but this I considered indispensable for a Bolshevik commander. Looking back I admit that at times I was too exacting, not always sufficiently restrained and tolerant of the faults of my subordinates... I could not bear to see any slackness in servicemen's work or behaviour. Some of them could not understand this, and I, for my part, was probably not tolerant enough of human frailties."

"[Zhukov] also showed great understanding for the potential of mechanised warfare."

In 1937, Stalin's purges reached the highest levels of the Red Army and many talented officers were executed or disappeared into the gulags. Even Zhukov was almost targeted. Once, he was interrogated by an extremely hostile superintendent regarding which purged officers he knew personally. Such accusations were often enough to end a career, and sometimes led to execution. Luckily, Zhukov's superior in the Belorussian Military District ended the investigation by dismissing the charges as nonsense.

In the summer of 1938, Zhukov finally received a posting that would hoist him up to the upper echelons of Soviet command and lead him to become one of Stalin's favourites. He was put in charge of Soviet forces at the border between Mongolia and Manchuria, where there was an unofficial border war with Japan. His enemy was the Japanese 6th Army, which had provoked several border incursions. When a major Japanese force entered Soviet territory as a prelude to a full-scale invasion, Zhukov thoroughly defeated them in the Battle of Khalkhin Gol in August 1939 (see pages 4-9). His victory was so complete that Japan ended all border skirmishes and Zhukov was awarded with his first Hero of the Soviet Union medal (he'd receive three more during his career).

His achievement was, however, overshadowed by the outbreak of World War II and so remained virtually unknown to the outside world. Yet the battle would have enormous significance for the outcome of the war as it ensured the Soviets wouldn't face a war a second front after the Germans invaded in 1941.

A brief period followed as commander of the Kiev Special Military District – the nation's largest – where Zhukov conducted the Soviet occupation of Bessarabia (modern-day Moldova) after Romania's forced withdrawal. Then, he was suddenly appointed chief of the General Staff by Stalin in February 1941, despite having no experience of the role.

As chief of the General Staff, Zhukov appears to have been aware of the growing German threat and fervently worked to develop Soviet armoured and mechanised forces. Defence plans were reworked, but suffered from a basic strategic error. The Red Army prepared for a possible German invasion with Ukraine as its main target, while in reality it would focus further north, in the direction of Moscow.

The mistake was Stalin's and not Zhukov's, but nobody dared speak out against the dictator. Stalin also failed to heed the warning signals from both spies and diplomats about Hitler's plans. Long after the war, Zhukov told the author Konstantin Simonov that Stalin trusted his ally Hitler, perhaps more than any other living person. Ironically, it was the man he trusted most who would come closest to crushing Stalin.

On 22nd June, 1941, Hitler launched Operation Barbarossa, which led to one giant defeat after another for the Red Army. During the interwar period, the Red Army had been thought to be one of the world's best and most dangerous armed forces, but it turned out to be inferior to the German invasion armies who penetrated deep into the country. After just a few months of struggle, the Germans captured Kiev and had both Moscow and Leningrad within reach.

In addition to the element of surprise, Soviet troops were weakened, partly through poor leadership (because of the officer purges and Stalin's interference in military affairs), poor cooperation between different branches and also because of poor levels of maintenance. Materiel, terrain and troop losses swelled to staggering numbers.

In this desperate situation where the Soviet Union was fighting for its very existence, Zhukov's star continued to rise. The Soviet general who dared to take independent and military logical decisions was valued – despite harsh pressure from the frustrated dictator in the Kremlin. It was in these trying circumstances that Zhukov's qualities as a military commander came to the fore.

One month after the German invasion, however, Zhukov was fired as chief of the General Staff after arguing with Stalin about the fate of Kiev. Zhukov claimed that it wasn't possible to defend the city. Stalin insisted, however, which led to a military disaster where the Soviet lost around 500,000 soldiers. After that, Zhukov was shuttled back and forth between important sections of the front to tackle difficult crises or plan counterattacks.

Sometimes he led the troops himself, sometimes he served as the Soviet Supreme High Command's representative and coordinated the operations of various army groups. Among other things, he was the brain behind the successful defences of ▶

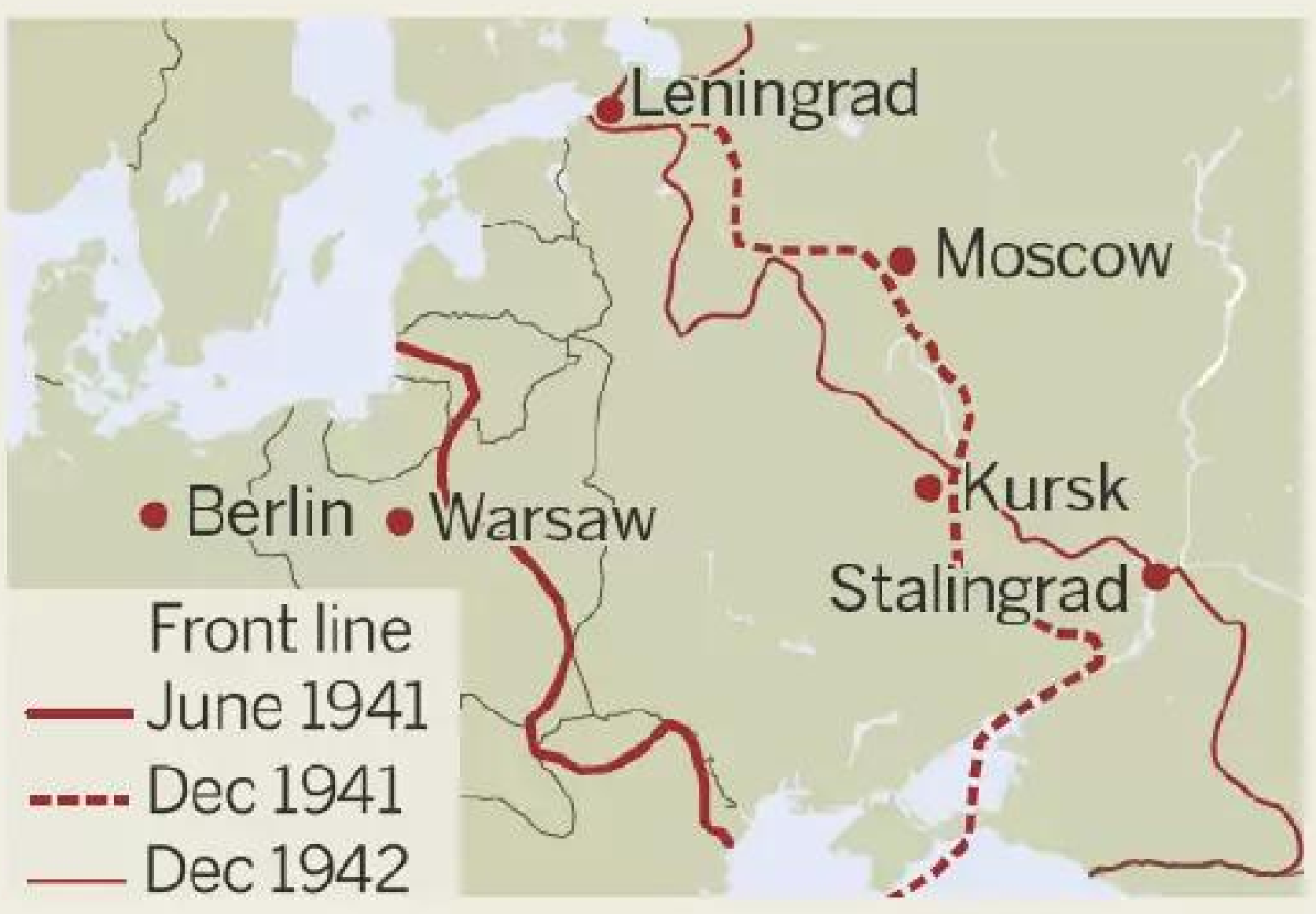
Progress on the Eastern Front

Moscow, December 1941
Zhukov leads a counterattack with rested Siberian divisions and manages to push the German troops back. The battle is considered crucial for the eventual outcome of WWII.

Stalingrad, January 1943
After a pincer movement, Zhukov seals the German 6th Army's fate. The battle was a major turning point in the war.

Kursk, July 1943
The Red Army, under the leadership of Zhukov, stops a massive German armoured offensive. The Wehrmacht loses the strategic initiative on the Eastern Front.

Leningrad, January 1944
After 900 days, Zhukov breaks the German siege of the city.



LONEGARD &CO

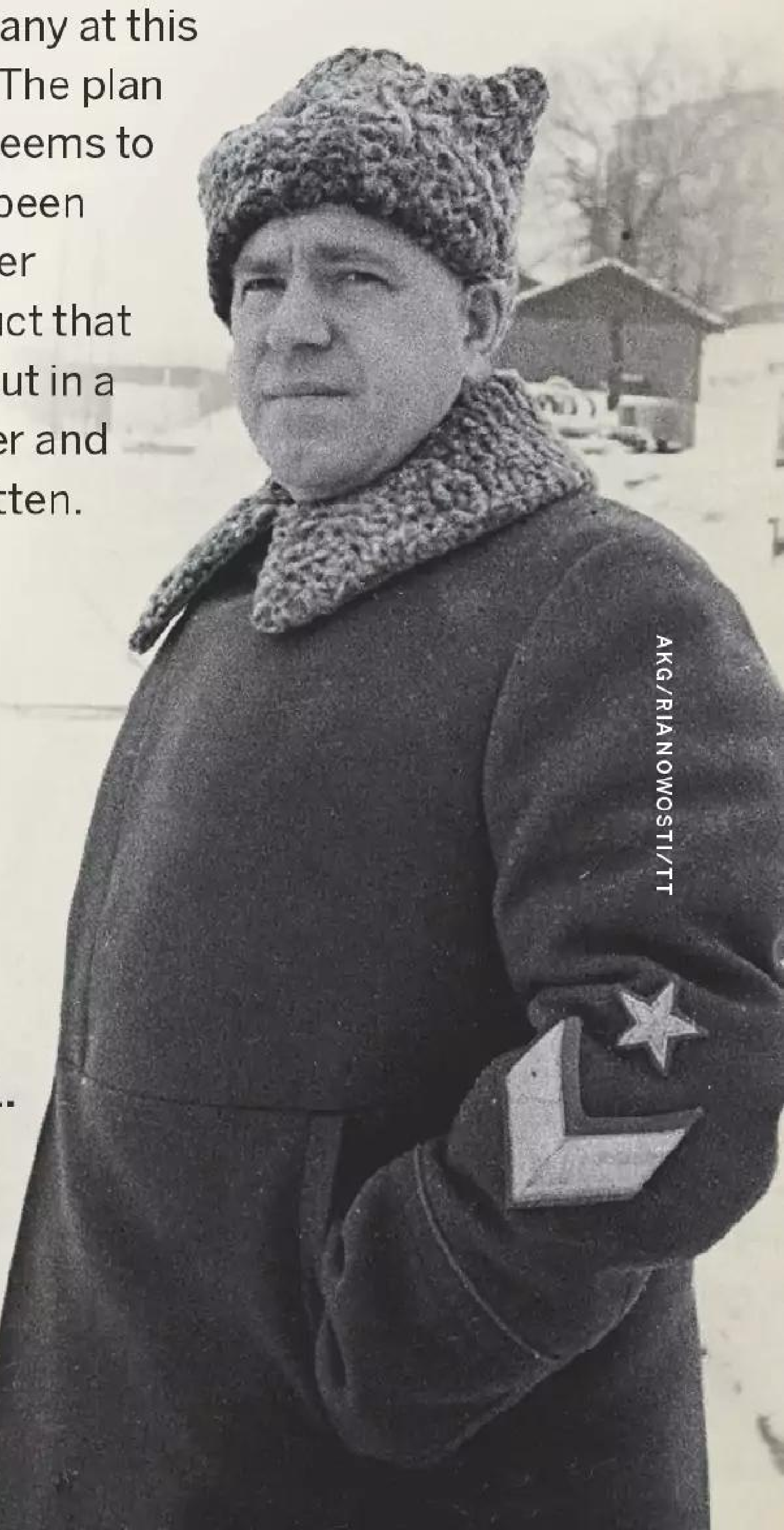
The map shows how the front moved from June 1941 to December 1942.

Berlin, April 1945
The German capital is occupied, which ends the war in Europe. Operation Bagration had commenced in June 1944. The German Army Group Centre had been wiped out, which collapsed the organised German defence on the Eastern Front. The offensive took Zhukov to Berlin via Warsaw.

First strike planned?

★ On 15th May, 1941 – one month before the German invasion of the Soviet Union, Zhukov had developed a plan for a pre-emptive strike against Germany in the summer of 1941. It was allegedly shown to Stalin by Defence Commissar Semion Timoshenko and Zhukov.

This document is highly controversial among historians. Some believe that the Soviet Union was seriously planning to attack Germany in the summer of 1941, and in Neo-Nazi circles it's believed this provides proof that Hitler invaded the Soviet Union only to avert a Soviet offensive. Most Western historians, however, agree that Stalin had not made any preparations for attacking Germany at this time. The plan also seems to have been a paper product that was put in a drawer and forgotten.



Zhukov at the front in 1941. In May of that year he had prepared a plan to attack Germany first.

AKG/RIANOWOSTI/TT

► Leningrad and Moscow in 1941, which stabilised the situation and halted the first German onslaught.

Having regained Stalin's confidence, Zhukov was appointed in 1942 as Deputy Commander-in-Chief, second only to Stalin. The dictator, who generally frowned upon dissenting opinion, seemed to respect Zhukov's direct and honest style.

"You know Zhukov was the only person who feared no one," testified Marshal Timoshenko. "He was not afraid of Stalin. He protected me more than once from Stalin. Especially in the early period of the war. He was a brave man."

While Zhukov protected many other officers from Stalin's wrath, he also gained enemies through his brutal methods. He scolded and rebuked people, punishing them on a regular basis when they failed to live up to his expectations. Many officers felt angry and humiliated after being exposed to Zhukov's ire.

Two such men were the generals Konev and Chuikov. In the autumn of 1941, Stalin ordered Konev be court-martialled for the failures on the front, but Zhukov saved him. Then Zhukov took command of the current front and demoted Konev to deputy. Konev, who had an equally hot temper like Zhukov, wasn't grateful – his humiliation was too great. Chuikov held a grudge because he believed Zhukov had taken too much credit for the defence of Stalingrad.

Throughout the war, Zhukov worked as both a field commander and Stalin's troubleshooter. Among other things, he planned and supervised the counteroffensive at Stalingrad in the late autumn of 1942, an action carried out to surround the German forces from both sides. These pincer movements were one of Zhukov's specialities, but he often encountered fierce opposition from Stalin, who preferred straightforward frontal attacks on the grounds the Red Army wasn't yet experienced enough for such complicated manoeuvres. In this regard, Zhukov would only enjoy freer rein towards the end of the war.

Zhukov was unable to take part in the victory at Stalingrad because he was redeployed to the other end of the Eastern Front to manage the first breakthrough of the German siege of Leningrad in January 1943. He was then coordinator for the Stavka (Soviet High Command) during the Battle of Kursk in the summer of 1943, although Marshal Rokossovsky later believed that Zhukov exaggerated his own role in that battle.

In January 1944 he finally broke the German siege of Leningrad and later that year led the huge Soviet summer offensive – Operation Bagration – which carried the Red Army all the way to the outskirts of Warsaw.

After that he led the army group 1st Belorussian Front, which captured Berlin in 1945. On the way, the soldiers under his command committed serious war crimes against German civilians in the form of rape, murder and robbery. Zhukov probably didn't encourage these actions, and may even have tried to prevent them since it reduced the combat readiness of his troops.

Zhukov's capacity as a field commander is highly controversial. On the one hand, there were few Soviet victories on the battlefield where he didn't play some part; on the other, his actions resulted in loss of life greater than any other commander in history. Soviet generals' contempt for their own soldiers' lives is well known, but it must be seen in the context of a totalitarian regime where individuals didn't matter and the collective was everything.

After Germany's fall, Zhukov was appointed commander of the Soviet Occupation Zone in Germany. His proudest moment may have been when he received the people's acclaim on a white stallion during the victory parade in Moscow on 24th June, 1945. The marshal was now an incredibly popular war hero – perhaps too popular as Stalin now began to regard him as a potential rival. On 10th April, 1946 he was fired from his post and dispatched to the Odessa Military District, a military backwater far from Moscow. In 1948, he was transferred to the Urals Military District, which wasn't much better. Only after Stalin's death in 1953 could Zhukov return to Moscow again where he became

IMPERIAL WAR MUSEUM

Berlin in July 1945. Happy times for the victorious generals. Zhukov is flanked by Field Marshal Montgomery (on Zhukov's left) and Konstantin Rokossovsky (on his right).

Soldiers of the Red Army advance during the final battle for Berlin in the spring of 1945.

SERGE PLANTUREUX/CORBIS/GETTY

Deputy Defence Minister. In 1955 he was promoted to Defence Minister and oversaw the invasion of Hungary the following year.

During the struggles after Stalin's death, Zhukov supported Nikita Khrushchev against his Stalinist opponents and backed his denunciation of and move away from Stalin's brutal policies.

In June 1957, he became a full member of the Presidium of the Central Committee, but quickly clashed with Khrushchev on the future direction of the armed forces. Khrushchev wanted to reduce the size of the army and navy, investing instead in strategic nuclear weapons. He had Zhukov removed from his position in October the same year.

In his memoirs, Khrushchev revealed that he believed that Zhukov wanted to stage a coup against him. Zhukov disappeared from public view, left isolated in his dacha. In the anti-Zhukov campaign that followed, several former military colleagues went on the attack, condemning the marshal for real and imaginary errors and injustices during World War II. One of his foremost critics was Vasily Chuikov, the defender of Stalingrad who'd subsequently led an army during the conquest of Berlin. Chuikov accused Zhukov of failing to capture Berlin in February 1945 before the German defences had time to reorganise. Zhukov later defended himself, arguing that his troops were at this point too exhausted and needed rest. In some military history works published around this time, Zhukov's efforts were almost completely ignored.

> **"It wasn't until... October 1964 that Zhukov returned to favour under new Soviet leader Leonid Brezhnev"**

It wasn't until Khrushchev himself was deposed in October 1964 that Zhukov returned to favour under new Soviet leader Leonid Brezhnev, but the 68-year-old received no new posts. At the 20th anniversary of victory over Germany, however, Zhukov was fully acclaimed, and the first edition of his memoirs was published in 1969.

When he died in 1974, he was still popular and celebrated in the Soviet Union. When the Lenin statues and other communist monuments were taken down after the Soviet collapse, the statues of Marshal Zhukov were among those left standing in the new Russian state. ✪

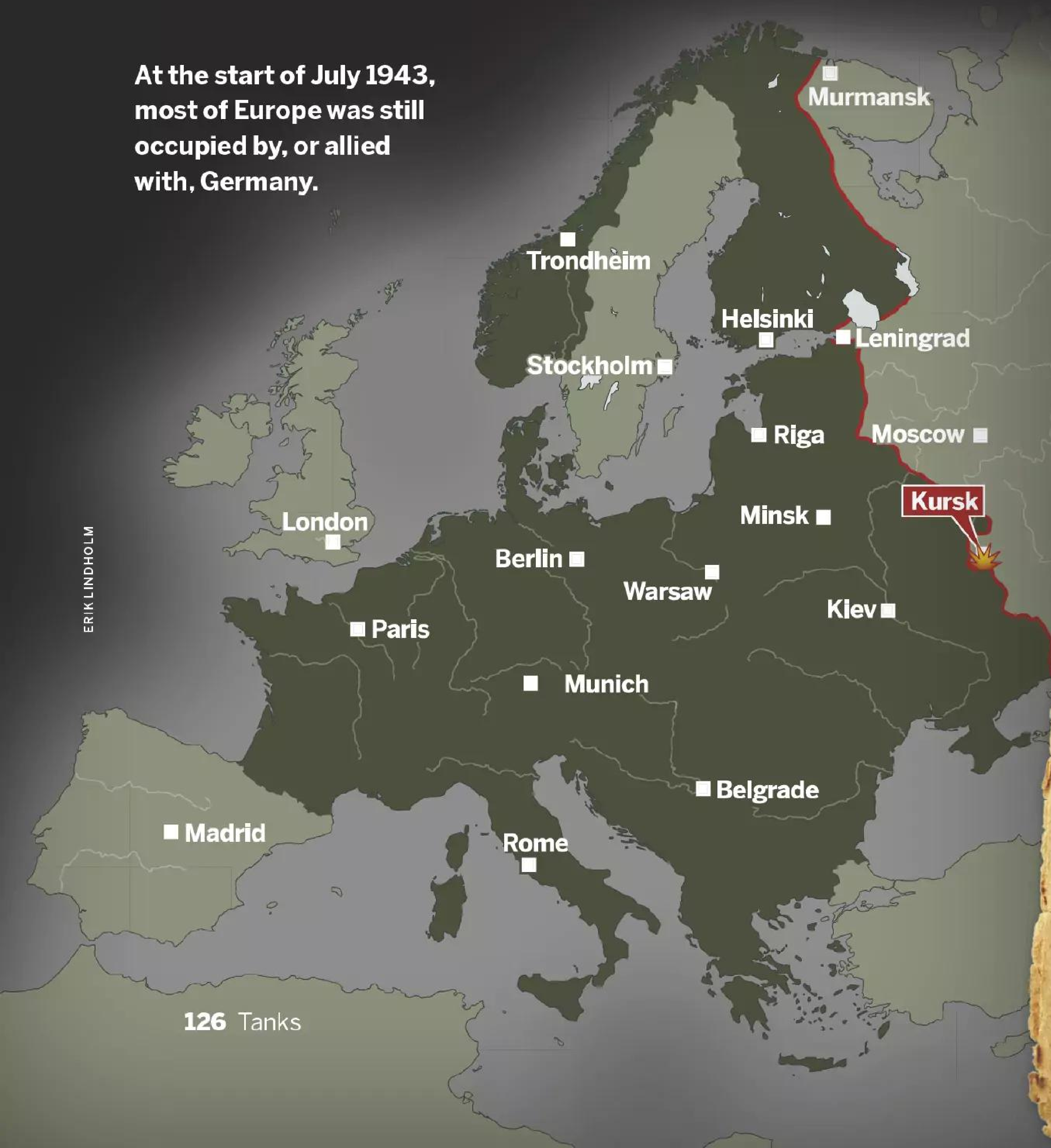
Niclas Sennerteg is a Swedish military historian and journalist.

Further reading: Stalin's General: Georgy Zhukov (2014) by Geoffrey Roberts ★ **Georgy Zhukov** (2012) by Robert Forczyk.

THE MYTH OF KURSK

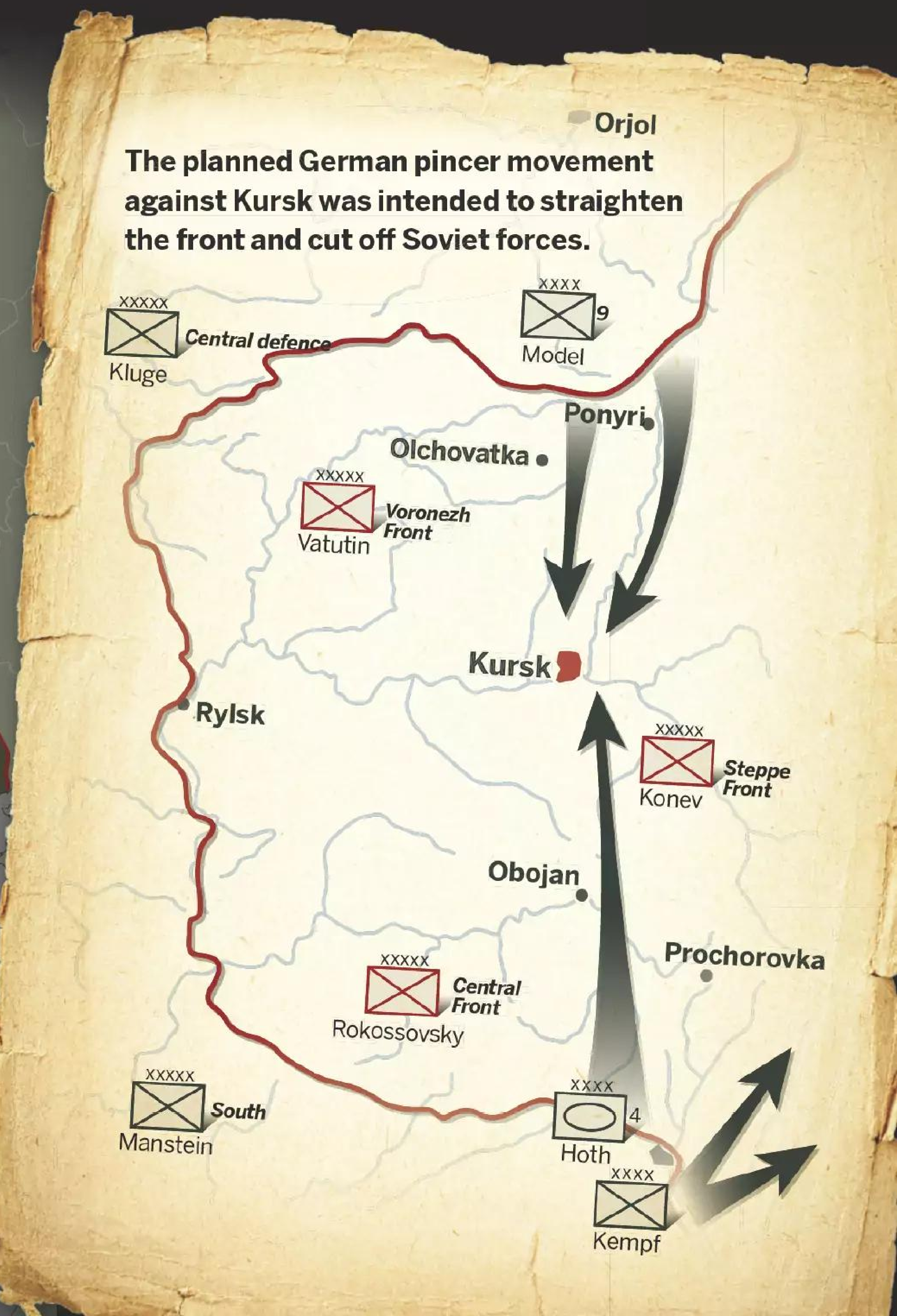
Dubbed "the world's greatest tank battle", the Battle of Kursk in July 1943 was no more extensive than many other battles on the Eastern Front, but myths still abound about what actually happened during Germany's last offensive in the Soviet Union.

Text: **RASMUS KJÆRBYE PETERSEN**


At the start of July 1943, most of Europe was still occupied by, or allied with, Germany.

Murmansk
Trondheim
Helsinki
Leningrad
Stockholm
Riga
Moscow
Kursk
Minsk
London
Berlin
Warsaw
Kiev
Paris
Munich
Belgrade
Madrid
Rome

ERIK LINDHOLM


The planned German pincer movement against Kursk was intended to straighten the front and cut off Soviet forces.

Orjol
XXXXX
Central defence
Kluge
XXXX
9
Model
Ponyri
Olchovatka
XXXXX
Voronezh Front
Vatutin
Kursk
Rylsk
XXXXX
Steppe Front
Konev
Obojan
Prochorovka
XXXXX
Central Front
Rokossovsky
XXXXX
South
Manstein
XXXX
4
Hoth
XXXX
Kempf

German tank divisions from Waffen-SS advance on 7th July, 1943. The Battle of Kursk became the final turning point of the war on the Eastern Front.

ULLSTEIN/IBL

On 10th May, 1943, Heinz Guderian went to see Hitler in Berlin to discuss production of the latest tanks with the Führer. Guderian had always been one of the few generals who was not afraid to voice his opinions to Hitler. After the meeting, once again he raised his old argument against Operation Citadel, the planned German offensive at Kursk.

"How many people do you think even know where Kursk is?" he said. "Why do we want to attack in the East at all this year?"

In a rare candid moment, Hitler replied, "You're quite right. Whenever I think of this attack my stomach turns over."

Both men understood the situation well. Kursk, which was being held by the Soviets, was a pocket of resistance in the middle of the German's front line. It was partly the result of a Russian winter offensive in the wake of the disaster at Stalingrad and partly due to a brilliant German counterattack that had stopped the Red Army and led to Kharkov (now Kharkiv) being recaptured in March 1943.

German High Command had hoped for a repeat of the success at Kharkov in their spring offensive at Kursk. The idea was to cut off the Soviets with a pincer movement from the north and south, closing the pocket and trapping the Soviets behind a newly sealed German front line. The move would then free up German troops who could be redeployed to other important sections of the front. However, the order for Operation Citadel had barely been issued before the plan began to fall apart.

First, the weather caused delays, and then the need to transfer forces to Italy ahead of the expected Allied invasion caused further disruption. Meanwhile, the Red Army reinforced its position inside the pocket and soon the two armies at Kursk were competing to strengthen their forces, which resulted in further delays. Hitler did not make things any easier with his insistence that the latest German weapons, Panther tanks and the heavy anti-tank gun Ferdinand, should also be taken into battle.

Guderian was not alone in thinking that the operation should be called off and that the army should instead remain on the defensive in 1943, using the time to re-arm and recover. For Hitler, however, this was a political impossibility. The two disastrous campaigns in Stalingrad and North Africa, which had happened almost simultaneously, had not only led to major losses of men and materiel, but had also shaken the faith of some of Hitler's allies. A German success on the Eastern Front was the only way to convince them that a final victory was possible. Besides, attack is the best form of defence and this was a way to sap the Red Army's offensive resources while giving his army the chance to rebuild.

Operation Citadel was a risk that even a gambler like Hitler would ordinarily have turned his nose up at, but he believed it was the only option.

The staff at Stavka, the Soviet headquarters, were equally uncertain about their plans for the war's

A German Panzer III moves into the field at Kursk. It was in this terrain that the heavy Tiger and Panther tanks could best utilise their superior guns against the Soviet T-34s.

ULLSTEIN/IBL

BUNDESARCHIV, 101I-219-0553A-15/KOCH/CC-BY-SA 3.0

A new vehicle that received its successful baptism of fire in the summer of 1943 was *Wespe* (Wasp), a 105-mm howitzer on a Panzer II chassis.

third year. The Red Army was still rebuilding. The disorganised force, which the Germans had almost wiped out in 1941, was long gone and had been replaced by a new generation of competent officers and experienced, confident soldiers. The process was far from complete, however, and Stavka was still struggling with a number of different issues.

In 1941, the Soviets' trump card had been their qualitatively superior tanks, but that advantage was now a thing of the past. The Russians had been so keen to produce T-34s that no-one had considered upgrading the model until Germany rolled out its superior Tiger tank in 1942. Now an improved T-34/85 was being built alongside other tanks that could match the German machines, but none would be ready for the Battle of Kursk.

Deputy Commander-in-Chief Georgy Zhukov, Stalin's best general, recommended that the Red Army let the Germans attack first. This was contrary to the attack-minded approach the two men usually adopted, but too many Soviet offensives against the Germans had ended in disaster. The only exceptions were the counteroffensives in the wake of the failed German attack on Moscow in 1941 and Stalingrad in 1942. As a result, Zhukov believed that they should, once again, hold their attack until the Germans had exhausted their offensive capabilities.

Kursk would be the rock against which the German Army would crush itself. It was so obvious to Stavka that the Germans would attack Kursk that the reports about Operation Citadel gathered by Allied spies working within Germany were almost superfluous. Consequently, the Red Army had gathered an enormous force inside the pocket and built some of largest defensive structures seen during the war.

Two fronts - the Central Front and the Voronezh Front – under the respective leadership of General Konstantin Rokossovsky and General Nikolai Vatutin – would hold the northern and southern part of the pocket behind three concentric lines of defence. As if that were not enough, the Steppe Front was also created, led by Major General Ivan Konev, which served as a strategic reserve and stood behind the Pocket of Kursk with its own multi-layered lines of defence.

"HOW MANY PEOPLE DO YOU THINK EVEN KNOW WHERE KURSK IS?"

The lines consisted of minefields, anti-tank obstacles and ditches, anti-tank guns with explosive shells, dug-in armoured vehicles and anti-infantry defences that would compensate for the Soviet's weaker armoured forces. Lieutenant General Nikita Khrushchev, the lead commissary officer at the Voronezh Front, demanded that soldiers learn the Tigers' weaknesses by heart, just as people had been forced to memorise 'Our Father' before the revolution. Intensive training would cure the troops of their fear of German troops and tanks.

After all the delays, the planned spring offensive became a summer offensive and Operation Citadel finally began on 4th July, 1943. In the lead up to the battle, the Germans carried out extensive front-line reconnaissance in an attempt to uncover the defence preparations on the Central and Voronezh Fronts. The Soviets guessed an attack was imminent, a supposition confirmed by interrogating captured German soldiers who revealed that the offensive would start at 03.30 the following morning.

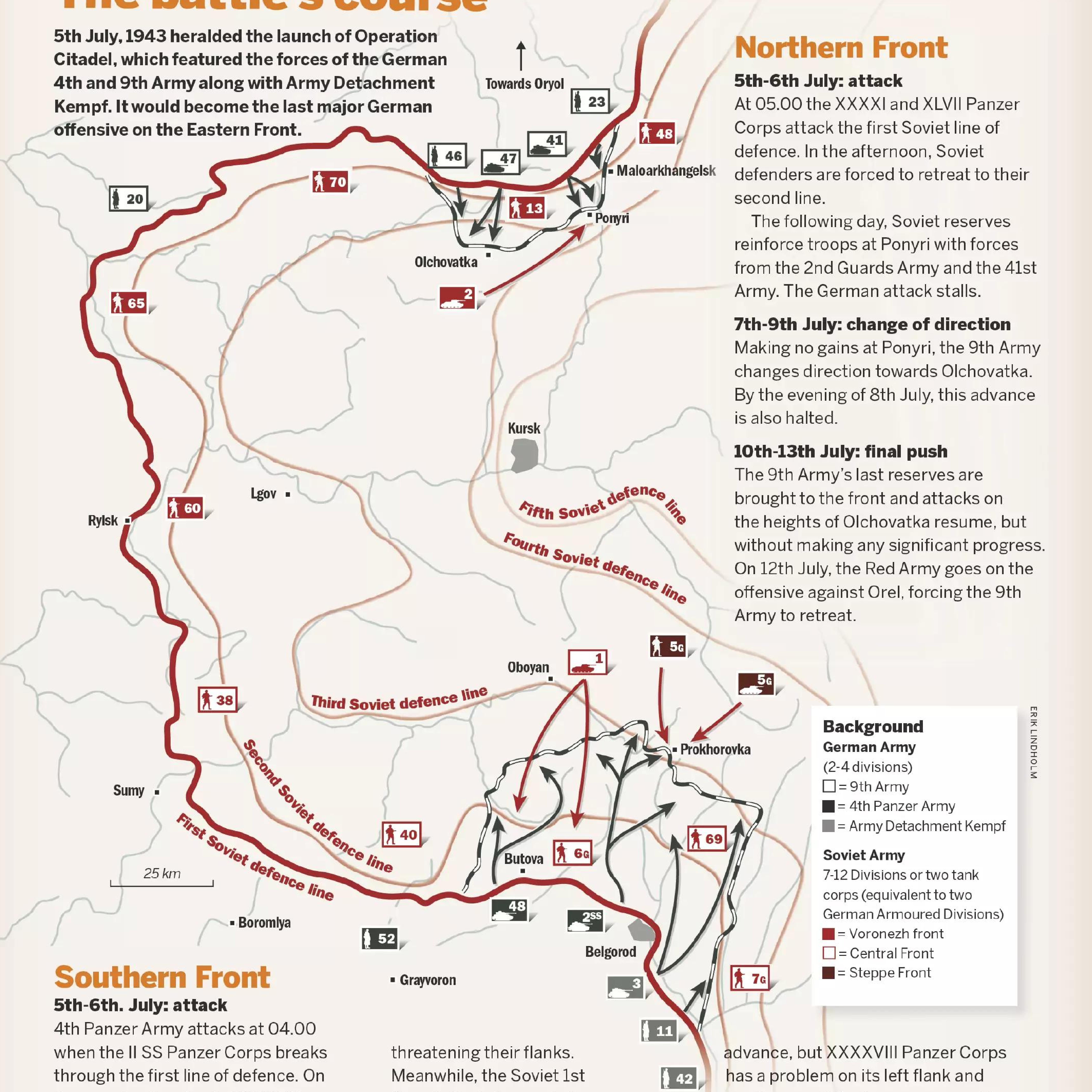
Armed with this information, both Rokossovsky and Vatutin launched artillery fire on German positions around 02.30, seriously disrupting German preparations and delaying General Hermann Hoth's 4th Panzer Army's advance from the south against the Voronezh Front until 04.00.

German tanks rolled towards the first Soviet line of defence. As expected, the Tigers spearheaded the advance, while the new Panther tanks waited patiently. The Panther was developed as a response to the T-34, with the same sloping hood, but with a significantly stronger 75-mm gun.

Unfortunately, there hadn't been time to fully test the model before it was deployed to the front line and the tank experienced a lot of teething problems as a result. In the early morning light, large flames appeared to be coming from many of their exhausts. Indeed, several Panthers were withdrawn from the battle at Kursk because of engine fires and other mechanical problems. The Panzer IIIs and IVs, which still accounted for most of Germany's tanks, ▶

The battle's course

5th July, 1943 heralded the launch of Operation Citadel, which featured the forces of the German 4th and 9th Army along with Army Detachment Kempf. It would become the last major German offensive on the Eastern Front.



Towards Oryol
23
48
41
46
47
Maloarkhangelsk
70
20
13
Ponyri
Olchovatka
2
65
Kursk
Lgov
Rylsk
60
Fifth Soviet defence line
Fourth Soviet defence line
5G
1
Oboyan
5G
Third Soviet defence line
Prokhorovka
38
Sumy
Second Soviet defence line
First Soviet defence line
40
69
Butova
6G
25 km
Boromlya
48
2SS
52
Belgorod
Grayvoron
3
7G
11
42
Background
German Army
(2-4 divisions)
☐ = 9th Army
■ = 4th Panzer Army
▨ = Army Detachment Kempf
Soviet Army
7-12 Divisions or two tank corps (equivalent to two German Armoured Divisions)
🟥 = Voronezh front
☐ = Central Front
■ = Steppe Front

ERIK LINDHOLM

Northern Front

5th-6th July: attack

At 05.00 the XXXXI and XLVII Panzer Corps attack the first Soviet line of defence. In the afternoon, Soviet defenders are forced to retreat to their second line.

The following day, Soviet reserves reinforce troops at Ponyri with forces from the 2nd Guards Army and the 41st Army. The German attack stalls.

7th-9th July: change of direction

Making no gains at Ponyri, the 9th Army changes direction towards Olchovatka. By the evening of 8th July, this advance is also halted.

10th-13th July: final push

The 9th Army's last reserves are brought to the front and attacks on the heights of Olchovatka resume, but without making any significant progress. On 12th July, the Red Army goes on the offensive against Orel, forcing the 9th Army to retreat.

Southern Front

5th-6th. July: attack

4th Panzer Army attacks at 04.00 when the II SS Panzer Corps breaks through the first line of defence. On the army's other flank, XXXXVIII Panzer Corps makes slow progress and Army Detachment Kempf barely moves at all. On 6th July, the advance stops and II SS Panzer Corps changes direction towards Prochorovka.

7th-9th July: change of direction

Both XXXXVIII Panzer Corps and Army Detachment Kempf make better progress, but the defenders still slip between the three German forces, threatening their flanks. Meanwhile, the Soviet 1st Guards Tank Army reinforces its front. The attack on Oboyan is resumed on the evening of 8th July, but continued flank attacks means it must defend itself from several directions. On 9th July, the II SS Panzer Corps continues its attack against Prochorovka.

10th-13th July: final push

The II SS Panzer Corps establish a bridgehead and continues its advance, but XXXXVIII Panzer Corps has a problem on its left flank and can't support the forces approaching Prochorovka. Army Detachment Kempf moves on the city from the south-east, to reduce the gap with the II SS Panzer Corps, but is halted by Soviet reserves.

West of Prochorovka on 12th July more hard fighting breaks out between the II SS Panzer Corps and the 5th Guards Tank Army. Elsewhere, Soviet reserves prevent the Army Detachment Kempf from reaching the city. Operation Citadel is called off the next day.

SCHERL/SZ-PHOTO/IBL

A German panzer soldier jumps down from a half-track SdKfz 251. Most of the fighting at Kursk was conducted by infantry.

followed in support. Soviet minefields and anti-tank guns tore apart the German tanks, especially Hitler's 'wonder weapon', the giant Ferdinand.

With its 88-mm gun, the Ferdinand could destroy any of the Soviet tanks from distance when properly deployed. The Germans failed to provide it with any close-support, machine-gun cover, though and so while they were still busy preparing it for action, Soviet troops swarmed in for the kill, leaving it too far behind to be of use. If the Panthers' efforts at the battle of Kursk were a disappointment, the Ferdinand's was a failure.

The Soviets' early-morning artillery assault had caused even greater disruption among General Walter Model's 9th Army forces than that experienced by 4th Panzer Army. Nevertheless, at 05.30, the German attack in the north also began.

Model had fewer tanks available than Hoth, however. and so he chose a different tactic. In the first wave, he sent his infantry and saved the tanks for deeper operations once they had broken through the Soviet front.

The breakthrough, however, was long in coming. Rokossovsky had assessed the situation correctly and realised that the 9th Army's primary attack route would pass through the town of Ponyri, which spans the railway line into Kursk. Therefore, he had ordered General Nikolay Puchov's 13th Army to hold a very narrow front section across that route, which made it possible for Puchov to deploy his 12 divisions at each line of defence.

With a lack of tank support, the 9th Army suffered huge losses in their attempt to penetrate the first line. Model only sent out his tanks tentatively, in small groups as required, rather than focussing their strength for greater impact.

Nonetheless, despite the tactical error, by the afternoon of 5th July, two divisions of Puchov's first echelon were close to collapse and shattered Soviet units had to pull back or surrender as the Germans surrounded them.

The 9th Army's victory was short-lived, however, as Puchov's second echelon relieved the first, ▶

"WITH A LACK OF TANK SUPPORT, THE 9TH ARMY SUFFERED HUGE LOSSES"

FLEVSHIN/RIA NOVOSTI/TT

Soviet soldiers, here with a 120-mm grenade launcher, wait for the German attack in well-prepared defence positions.

▶ establishing a well-formed line of defence on both sides of Ponyri. Model's men had to start over again.

Things were going better in the south for Hoth. Despite major losses elsewhere, Paul Hausser's II SS Panzer Corps – one of Germany's best tank units, which was located on the right flank of 4th Army – moved quickly through the first Soviet line.

Vatutin's forces were not as concentrated as Rokossovsky's, and General Ivan Chistiakov's 6th Guards Army with its seven divisions was forced to cover a longer frontal section than the 13th Army in the north.

At about 05.30, Hausser's tanks had made their way through the first line of defence, then sped towards the main road to Oboyan; the 4th Panzer Army's first goal towards Kursk.

For a while, it seemed to the Germans as though the happy blitzkrieg days were back, but the Soviet defence soon stabilised. Vatutin sent in his mobile reserve, the 1st Guards Tank Army, to help strengthen the 6th Guards Army.

"HOUSE BY HOUSE AND SHELL BY SHELL, THE GERMANS SLOWLY ADVANCED."

At the end of the day, the II SS Panzer Corps was unable to advance further, partly because of ever-stronger resistance, and partly because the Corps stood quite alone in Russian territory: the units that should have advanced on either side of it and covered its flanks had experienced problems getting through the first Soviet line. Therefore, Hausser's troops had to protect their own flanks, which significantly reduced their offensive power. By the evening of 6th July, the German attack seemed to have ceased both in the north and in the south.

Fighting between the 9th and 13th Army around Ponyri was particularly hard. After the battle, both German and Soviet soldiers called the small town "the Stalingrad of the Kursk salient". House by house and shell by shell, the Germans advanced. After each hard-fought skirmish, they were faced with new defences and fresh Soviet forces.

Model was forced to accept that he would not arrive in time to join Hoth at Kursk along the Ponyri route. Instead, he sent the 9th Army

ROGER-VIOLLET/IBL

A Tiger tank from the SS-Division Das Reich rolls over the Steppes during the Battle of Kursk.

south, towards the strategically important heights west of Olchovatka, but if he had hoped that Soviet defence would be weaker there, he was disappointed. For two days, the 9th Army slowly headed towards the hills, but by the evening of 8th July, Model's forces were exhausted. The attack in the north had failed.

From 7th July, Hoth's prime objective was to apply pressure on his flanks to enable the II SS Panzer Corps to resume its advance. During the following days, despite relentless Soviet resistance, he managed to bring the XXXXVIII Panzer Corps (Hoth's second spearhead) up in line with Hausser's corps on the left flank of the Army.

Now, however, the XXXXVIII Panzer Corps' flank was threatened, which meant that it was obliged to defend its position instead of continuing the advance towards Oboyan.

On the other hand, the II SS Panzer Corps had managed to free up forces so that it could continue, although without the XXXXVIII Panzer Corps its commanders weren't sure how much progress they could make. Within a day of restarting, Hoth's corps found a weak point in the Soviet lines in the north-east. It was the wrong direction, but they could potentially head back towards Kursk once they had broken through the Soviet front.

On evening of 9th July, Hoth decided to switch the direction of his attack from Oboyan to Prochorovka.

By this point, Vatutin had used all his reserves at the Voronezh Front. The only thing left to do was to recommit exhausted units that had already been battered in earlier front-line fighting and await the reinforcements that Stavka had released from Steppe Front, including the 5th Guards Tank Army led by General Pavel Rotmistrov. Despite his school-teacher-like appearance, Rotmistrov was a true fighter. As his forces arrived to take up position for a counterattack at the Prochorovka Front, he spotted a number of German tanks advancing.

Earlier in the battle, Vatutin had decided that it was too risky to send T-34s against the new German tanks' long-range guns. It was better to use them as ▶

BUNDESARCHIV:101I-022-2948-19/WOLFF/PAUL DR./CC-BY-SA 3.0

The grave of a German soldier, Heinz Kühl, who was killed at Kursk.

▶ motorised anti-tank guns, well hidden in buried positions until the Germans were within close range.

There was no more time to play it safe, though. The line at Prochorovka was the third and final one of the primary defence lines. Rotmistrov decided to advance quickly to close the gap and break through the expansive lines of German tanks.

In fact, Rotmistrov's fear was unfounded and the odds he faced exaggerated: by the time he attacked most of the new German tanks had failed or been destroyed. Some sources indicate that there were as few as three operational Tigers at the Battle of Prochorovka. Rotmistrov needed to stop the Germans quickly; he knew that more armoured forces were approaching from the south. If he dallied, he risked being caught between two forces.

Captain Rudolf von Ribbentrop, the son of the German Foreign Minister, commanded a tank company in the I SS Panzer Regiment. He later described his experiences on the morning of 12th July, when the regiment attacked Prochorovka.

"As we waited to see if further enemy tanks were going to appear, I looked all around as was my habit. What I was saw left me speechless. From beyond the shallow rise about 150 to 200 metres in front of me appeared fifteen, then thirty, then forty tanks. Finally, there were too many to count. The T-34s were rolling towards us at high speed, carrying mounted infantry...

"Soon the first shell was on the way and with the impact a T-34 began to burn. It was only fifty to seventy metres from us."

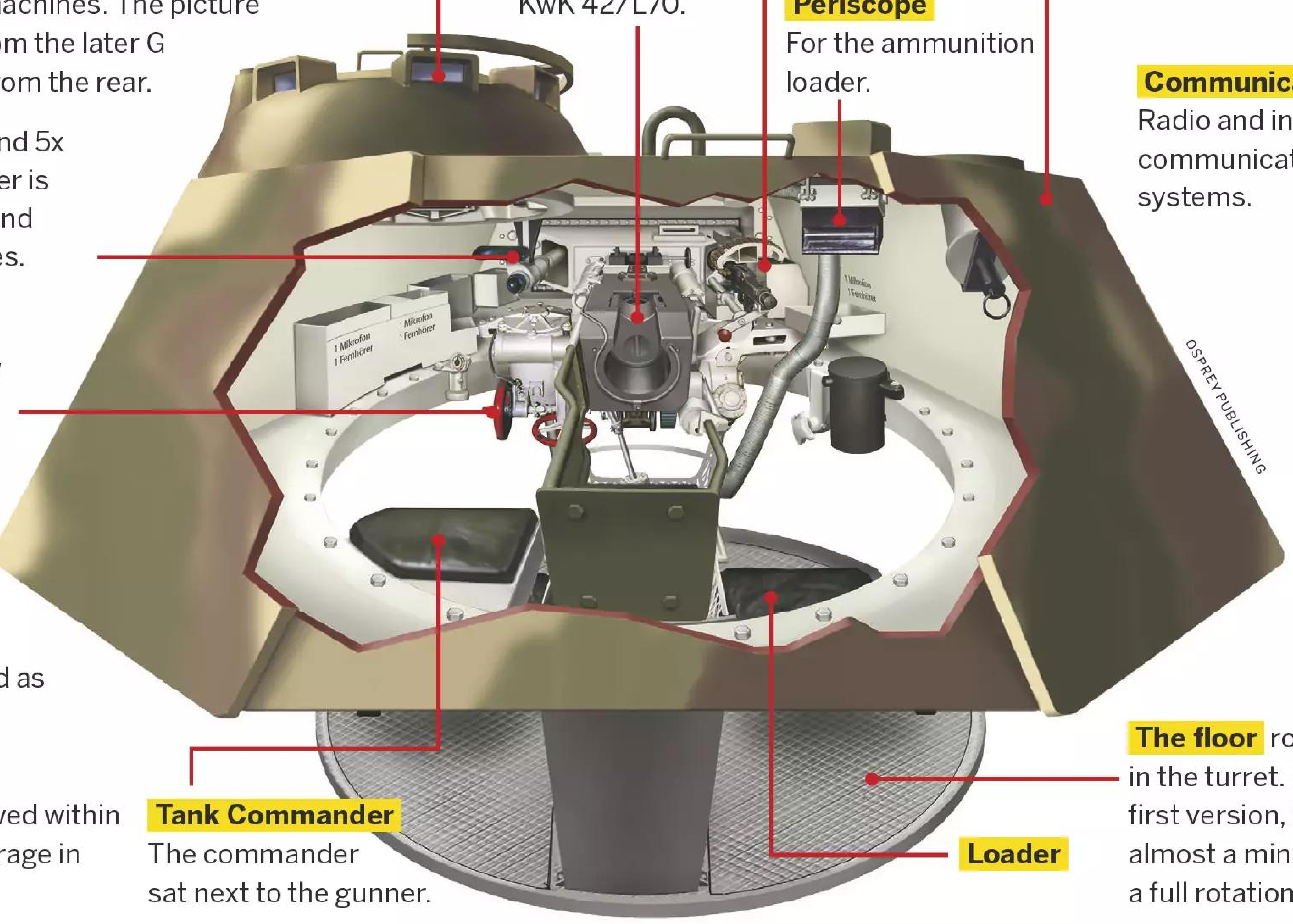
The clash at Prochorovka is probably one of World War II's most mythologised events. It has come to be known as "the world's greatest tank battle" with reports of over two thousand tanks clashing like medieval knights on horseback. But the numbers are hugely exaggerated.

The most cautious estimates state that only 206 tanks – 53 German and 153 Soviet – were in the field on 12th July.

The discrepancies are partly due to how the battles are defined. Do you only count the number of II SS Panzer Corps' tanks present at Prochorovka when Rotmistrov's 5th Guards attacked? Or do you include the tanks in all three Panzer Corps

Panzer V 'Panther'

★ Despite its many teething problems at Kursk, the German Panther tank is often considered to be one of the war's best and most complete machines. The picture shows a turret from the later G version as seen from the rear.



Gunsight with 2.5x and 5x magnification: the lower is used for observation and firing at short distances.

Directional gun was directed vertically with a steering wheel and to the side of it was a motor that rotated the tower. There was also a lateral steering wheel for fine tuning that could also be used as a backup.

Ammunition 79 shells could be stowed within the tank, including storage in the sides of the turret.

Tank Commander The commander sat next to the gunner.

Observation hood The tank commander's hood with periscope.

Gun 75-mm KwK 42/L70.

Machine gun Parallel-connected 7.92-mm MG 42.

Periscope For the ammunition loader.

Tank 1,100-mm armour plate at the front (12-degree slope), 45 mm on the sides and rear (25-degree slope).

Communication Radio and internal communication systems.

The floor rotated in the turret. In the first version, it look almost a minute for a full rotation.

Loader

OSPREY PUBLISHING

Divisions? Even taking the broadest definition, though, it's still not possible to reach 2,000 tanks.

Neither the size of the battlefield, nor how the battle was fought - the same tanks featuring in different clashes as they drove between sites – differed from the norm on the Eastern Front. The idea that the battle on the 12th July was the mother-of-all tank duels is simply a myth.

Although fighting continued around Prochorovka after the 12th, Hoth's offensive force was virtually spent. At Stavka, Zhukov realised that the time was ripe to launch the first of the two major counteroffensive upon which the Soviet's Kursk plan depended. On 12th July, just as the Battle of Prochorovka was at its most intense, the Red Army commenced Operation Kutuzov, the counterattack from the north. Its objective was to force the collapse of the German forces positioned on the Orel salient by cutting behind Model's 9th Army, before encircling and destroying it.

In light of the Soviets' new offensive and the lack of headway being made by his own forces, Hitler suspended Operation Citadel the following day, 13th July. Fighting in the south continued for another few days, but by the 15th July, the 4th Panzer Army was forced to retreat. On 23rd July, it found itself back at square one. That was when the Soviets launched Operation Rumyantsev, the second of their two major counteroffensives. This one was aimed at the forces to the south of the Pocket of Kursk. Just as Zhukov had hoped, Operation Citadel had sapped the German army's offensive strength, and the Red Army could now push the Nazis back towards the Dnieper.

The exact size of each force and the losses sustained during Operation Citadel are difficult to ascertain. After the war, German sources exaggerated the number of Russians to explain their defeat, while Soviet sources exaggerated the German numbers to make their victory more noteworthy.

As a result, the topic has remained the subject of a vigorous academic debate that continues to this day, with the assessment of the numbers of tanks destroyed varying greatly from text to text. German crew losses are estimated to be somewhere between 49,000 and 56,000 and Soviet losses about 177,000. German tank losses have been estimated to be between 250 and 1,600 and the Soviet tank losses between 1,600 and 2,600.

Most of the battle at Prochorovka is unreasonably exaggerated. The most cautious calculations make it seem a rather modest affair by the standards of the day, but even if you double or triple those numbers, the battle was no greater than any other clash on the Eastern Front.

No matter what the numbers, the fact remains that the Germans lost both the battle and the initiative on the Eastern Front, something they never managed to reclaim. From this point forward, it was Stalin and Zhukov who dictated the terms.

The German attack failed partly because they attacked an enemy that was numerically superior, but that wasn't the only reason. At the battle of Kursk, the Red Army showed that it could match the Germans in terms of experience and tactical skills. The last word goes to Hermann Hoth:

"The Russians have learnt a lot since 1941. They are no longer peasants with simple minds. They have learnt the art of war from us." ✪

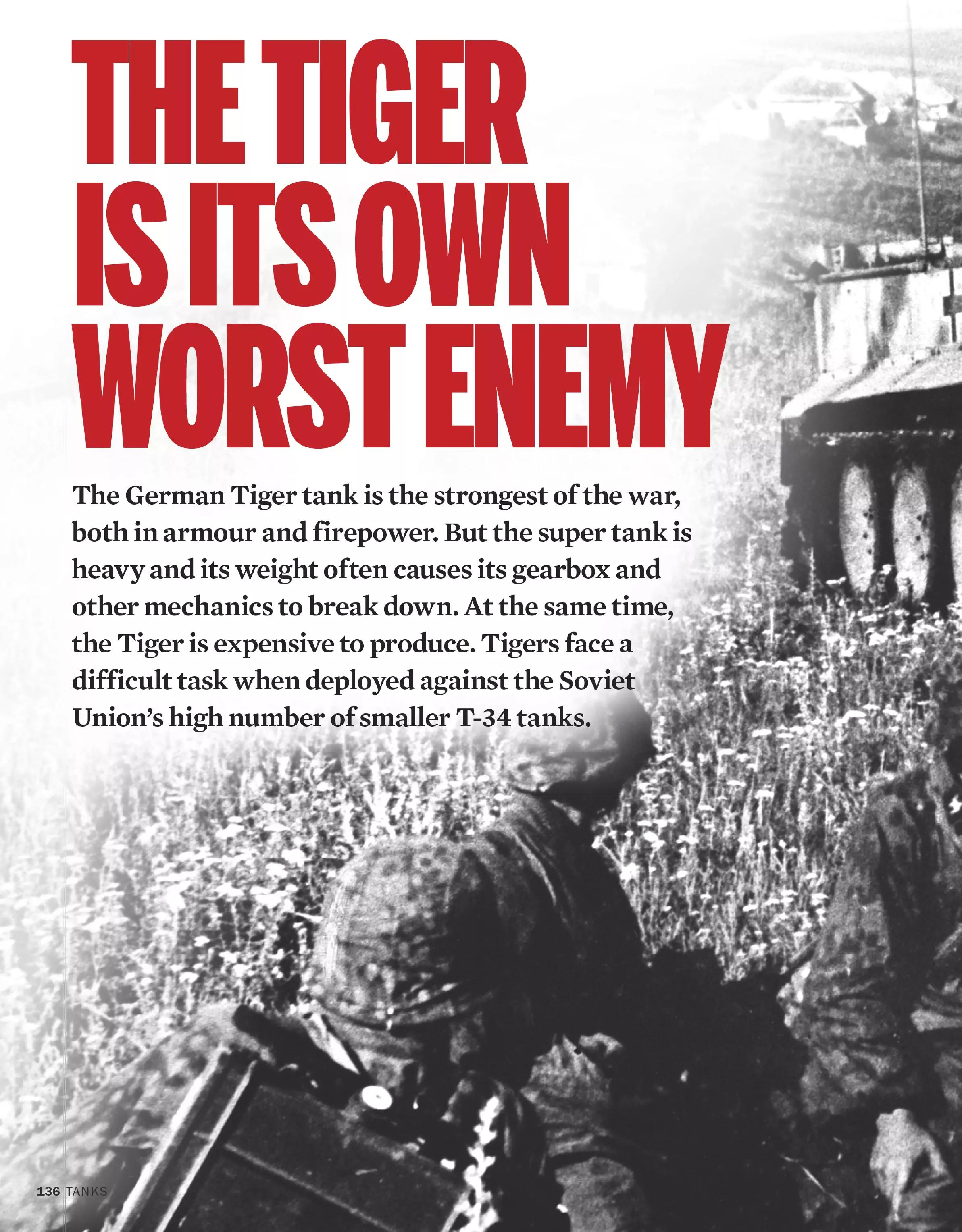
Rasmus Kjærbye Petersen is a historian and freelance writer.

Panther Tanks in Division Großdeutschland fought in XXXXVIII Panzer Corps on the Voronezh Front in the south.

SZ-PHOTO/IBL

"THE GERMANS LOST BOTH THE BATTLE AND THE INITIATIVE ON THE EASTERN FRONT"

Further reading:
Kursk 1943: A Statistical Analysis (2004) by Niklas Zetterling and Anders Frankson ★ **The Battle of Kursk** (1999) by David M Glantz and Jonathan M House ★ **1943: The tide turns in the East** (1992) by Mark Healy



THE TIGER IS ITS OWN WORST ENEMY

The German Tiger tank is the strongest of the war, both in armour and firepower. But the super tank is heavy and its weight often causes its gearbox and other mechanics to break down. At the same time, the Tiger is expensive to produce. Tigers face a difficult task when deployed against the Soviet Union's high number of smaller T-34 tanks.

German soldiers move forward in a Tiger I during Operation Citadel in the Soviet Union in July 1943.

SOVIET UNION

Tiger I tanks are being sent into the field on the Eastern Front. They must turn the fortunes of war in the Soviet Union after the Germans invaded in the summer of 1941 with tanks that are no match for the Russian T-34s. The Tiger may be a game changer: it can destroy T-34s before it comes within range of the Soviet tank.

THE EARTH SHOOK UNDER THE TANK'S TRACKS, while its commander SS-Untersturmführer Michael Wittmann chose his next target from his seat atop the tank's gun turret. As usual, the taciturn Wittmann issued short, precise orders like "Turn left", "Target 100 metres" and "Go!"

Around 2,000 German and Soviet tanks were convened together on the great plain south of the Russian city of Kursk. Fighting had been almost uninterrupted on this battlefield since it had started a week earlier on 5th July, 1943. It was the largest tank battle the world has ever seen, but Wittmann could feel reasonably secure in his armoured skin: for the first time the 28-year-old SS officer was in command of Germany's top tank, the Tiger I, in a major battle.

Despite the Tiger's heavy weight, it reacted quickly to any threat. Instead of spending half a minute turning the heavy gun turret, Wittmann could turn the entire tank around in a few seconds. The medium Soviet T-34 tanks didn't stand a chance. Eight tanks, three anti-tank guns and a gun battery soon fell to Wittmann's Tiger I. The battle's approximately 70 other Tigers also pounded more Russian combat vehicles.

As darkness fell, the Russian plains were covered with charred bodies, and black columns of oily smoke rose from hundreds of burning wrecks. About 700 tanks had been shot to pieces.

Most were Soviet and German medium-sized tanks, but the Germans – despite losing the battle at Kursk – had not lost many Tigers. Also, Wittmann would be returning to his division, having just

1914-1944

NAME **MICHAEL WITTMANN**

TITLE TIGER COMMANDER

Ace destroyed 138 tanks

Michael Wittmann was one of Germany's best Tiger commanders, and during the war he was noted for the destruction of no less than 138 Allied tanks, 132 anti-tank guns and a number of anti-tank vehicles. In battle for the French town of Villers-Bocage with British forces, he hit 14 tanks, 15 trucks and two anti-tank guns on his own in the space of just 15 minutes.

The propaganda machine in Germany made great use of Wittmann, and the Bavarian-born SS soldier was portrayed as a hero. He was part of the Leibstandarte SS Adolf Hitler division that took part in the annexation of Austria and the Sudetenland. In the spring of 1941 he was assigned to the SS Panzer Regiment 1, commanding small tanks. By 1943 he was in command of Tiger 007 at the Battle of Kursk.

In 1944 Michael Wittmann's unit moved to Northern France to counter the Allied invasion. Here, the famed Tiger Commander and SS-Hauptsturmführer became a victim of a British tank strike on 8th August, 1944.

- **Received the Knight's Cross with Oak Leaves and Swords.**
- **Married five months before his death.**

made his name as the Nazi's undisputed champion tank commander. A large part of his success could be attributed to the Tiger, however, which had proved to be a formidable weapon since its introduction in 1942.

A 60-tonne Tiger I tank drives straight through houses in its path.

T-34 COULD NOT RETALIATE

By May 1941, Hitler had already ordered the military vehicles. He demanded strong armour, huge firepower and a waterproof hull with snorkel equipment, so the tank could cross the many rivers in France and the Soviet Union without problems.

While engineers worked on the tank, Hitler sent the German army into the Soviet Union in June 1941. The Wehrmacht countered any resistance and quickly occupied large areas of land, yet on one side, Hitler's army met unexpectedly stiff resistance: the Soviet T-34 tanks were far superior to the German Panzer and Panther models.

After almost a year – where the military vehicles' deficiencies had been exposed time and again – German engineers were able to give the armoured divisions some good news: the first Tiger I was ready. The Germans began training officers to serve on the advanced super tank immediately.

The new weapon was built for its firepower and impervious armour. With massive ammunition and fuel storage the giant weighed up to 60 tonnes. Nevertheless, it was not much slower than its enemies: in uneven terrain it could thunder at 20 km/h. Its top speed was twice that figure.

In autumn 1942 the Tigers were sent to the Eastern Front, and the Red Army quickly learned to fear its powerful 88-mm guns. In the right weather condition, a Tiger I could totally annihilate a Soviet T-34 from up to 2,200 metres away. At that distance, the T-34s could not retaliate.

SOLDIERS GOT "TIGER PHOBIA"

Despite the German defeat, the Tiger showed its worth in the Kursk and Kharkov battles in the summer and winter of 1943 respectively. During the month that the battle lasted, only 18 Tigers were lost – a result that was not unusual. During the war, the Tiger took out almost 10,000 enemy tanks for a loss of just 1,715 Tigers. The Red Army's fear of the tank was immense.

New ammunition is loaded on board. The tank's armament included 92 armour-piercing shells.

Soviet propaganda tried to strengthen troop morale by sending out false reports about the vulnerability of the Tigers. In the summer of 1943 the Soviet Union proclaimed that the Red Army defeated 10-12 Tigers a day.

The propaganda soon became so unrealistic that, after a couple of weeks, the Soviet Union claimed to have destroyed more Tigers than actually existed.

However, the Soviet's attempt to make Hitler's tank seem less fearsome didn't have much effect. Just the rumour that Tigers waited ahead was enough to spread terror through the Red Army.

The Allies experienced a similar fear among its soldiers, which the British came to dub "Tiger phobia". In an attempt to curb his soldiers' fear of the superweapon, Field Marshal Bernard Montgomery forbade his officers to talk about the Tiger with the rank-and-file soldiers.

Several German tank commanders had also demonstrated that the enemy was wise to fear a Tiger I. For example, Wittmann defeated 117 enemy tanks during his seven first months as a Tiger commander.

THE ENEMY NEVER CAME WITHIN RANGE

Germany's famous tank divisions came to battle once again when 33 Soviet tanks broke through German lines in Ukraine on the morning of 8th January, 1944.

Wittmann turned up immediately. The now 29-year-old SS officer had 12 Tiger tanks under his command. Crackling machine guns, cannons and engine noise resonated over the snowy fields, but on this icy morning, low-lying fog prevented him from seeing far ahead. Suddenly, the enemy's tanks appeared in the ghost-like landscape. Wittmann determined ►

> **"In thankful appreciation… I award you… the Knight's Cross of the Iron Cross"**
>
> Adolf Hitler to Michael Wittman in January 1944

“Hit somebody with your fist and not with your fingers spread”

Heinz Guderian, German general and tank commander

▸ their position, and the gunner set the Tiger’s 88-mm cannon. A shell blew up the turret of the first T-34.

Several other tanks had appeared in the meantime, and Wittmann had a myriad of targets to choose from. He created a furious wall of fire. A shell hammered into a T-34, which was about launch its weapon on the German battalion. Shortly after, Wittmann’s Tiger set its sights on another enemy tank. The unit’s fire overwhelmed the Soviet invaders, who hesitated – fatally. The Germans surrounded their tanks in a pincer movement, and four hours later they were defeated. 33 T-34s and seven guns were either out of action or in flames.

Once again, the Tiger had demonstrated its superiority against the Russian T-34s, which had less armour and a shorter range of fire. The Russians had to get within 1,600

The great German Tiger tank storms through the battlefield between the smaller Russian T-34s.

metres of a Tiger to destroy it, while the Tiger could promptly hit a T-34 from a distance of 2,200 metres.

TIGER WAS TOO EXPENSIVE TOO OPERATE

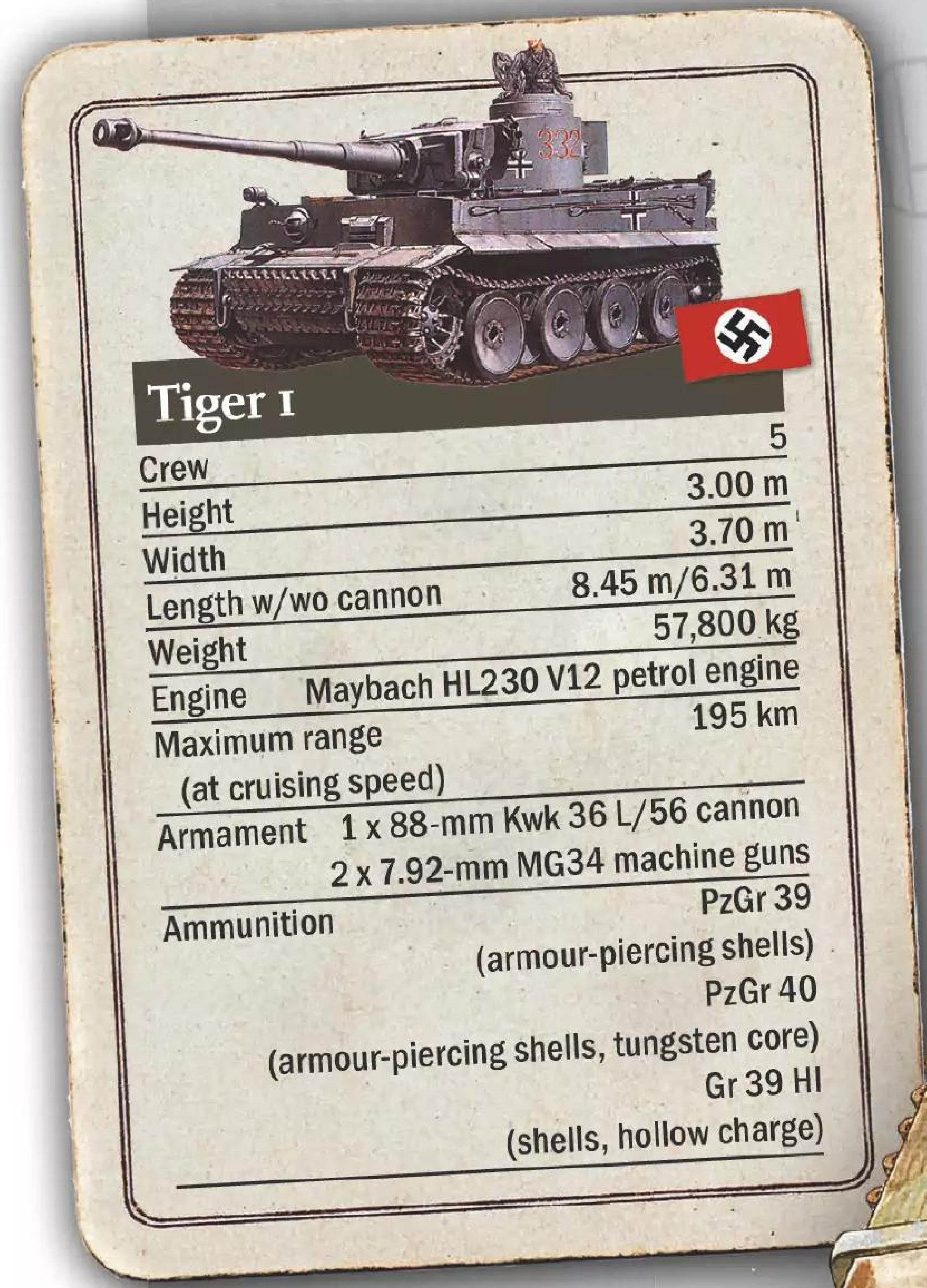
But the Tiger's success was not enough to turn the fortune of war Hitler's way, and ironically it didn't help when in the summer of 1944 German engineers delivered the first improved version of the victorious super tank to the army: Tiger II, which was also dubbed the King.

The German army was now constantly retreating in winter-cold Eastern Europe – something the Tiger wasn't designed for. It already consumed huge amounts of fuel – 15 litres per kilometre driven – so in high snow or deep mud the demanding engine burned even more. ▸

TANK

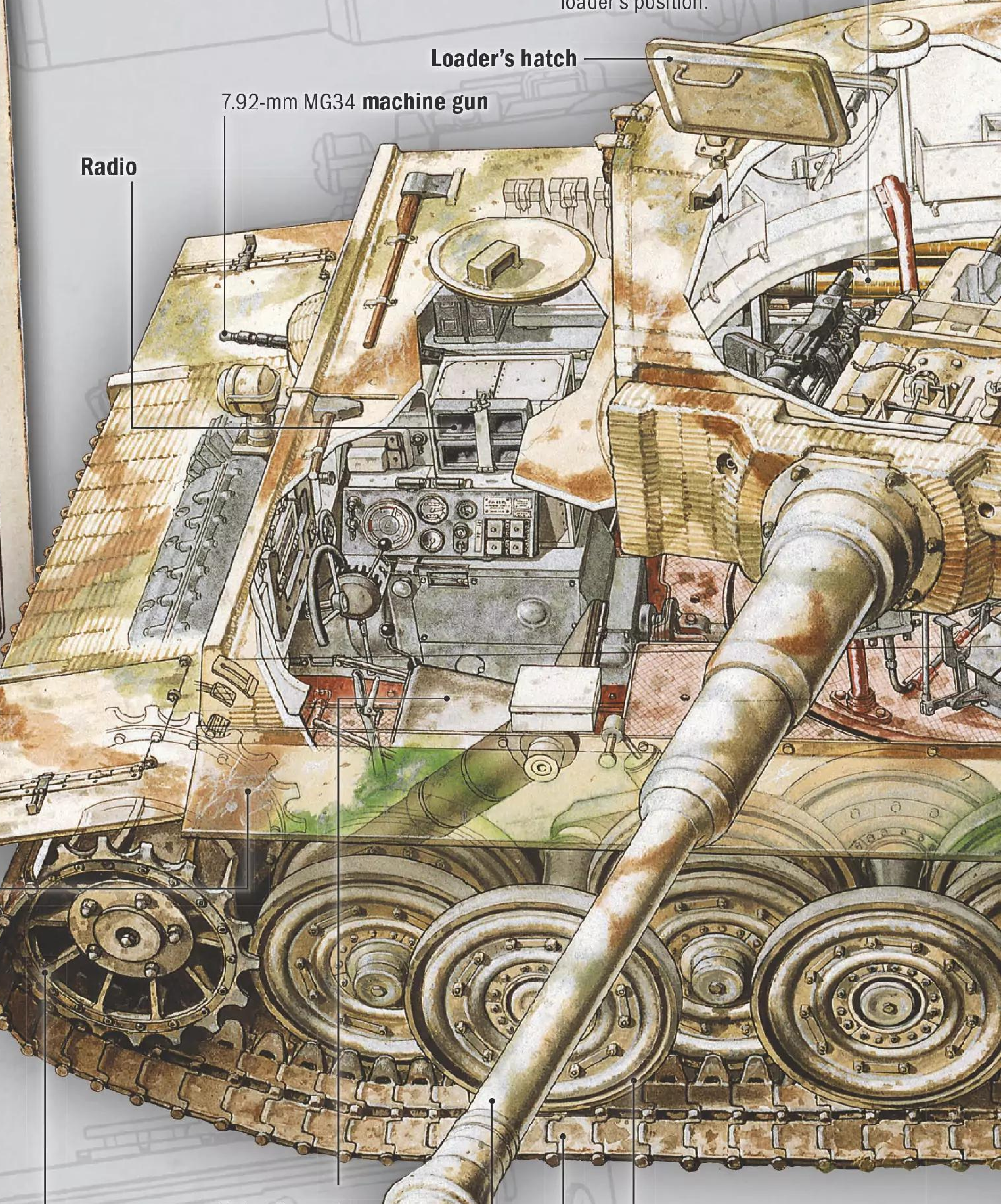
Tiger was a born killer

The German company Henschel & Sohn produced 1,347 Tiger I tanks. They were all equipped with the most advanced technology that Nazi Germany could provide.



Tiger I

Crew	5
Height	3.00 m
Width	3.70 m
Length w/wo cannon	8.45 m/6.31 m
Weight	57,800 kg
Engine	Maybach HL230 V12 petrol engine
Maximum range (at cruising speed)	195 km
Armament	1 x 88-mm Kwk 36 L/56 cannon 2 x 7.92-mm MG34 machine guns
Ammunition	PzGr 39 (armour-piercing shells) PzGr 40 (armour-piercing shells, tungsten core) Gr 39 HI (shells, hollow charge)


Loader's hatch
7.92-mm MG34 **machine gun**
Radio
Driver's seat
Shock absorber
Gunner's seat
Rubber-padded steel deck
88-mm Kwk 36 L/56 **cannon**

92 shells for the 88-mm gun were stored right next to the gun loader's position.

From September 1943, engineers covered the Tigers with a non-magnetic anti-mine coating **(Zimmerit)**.

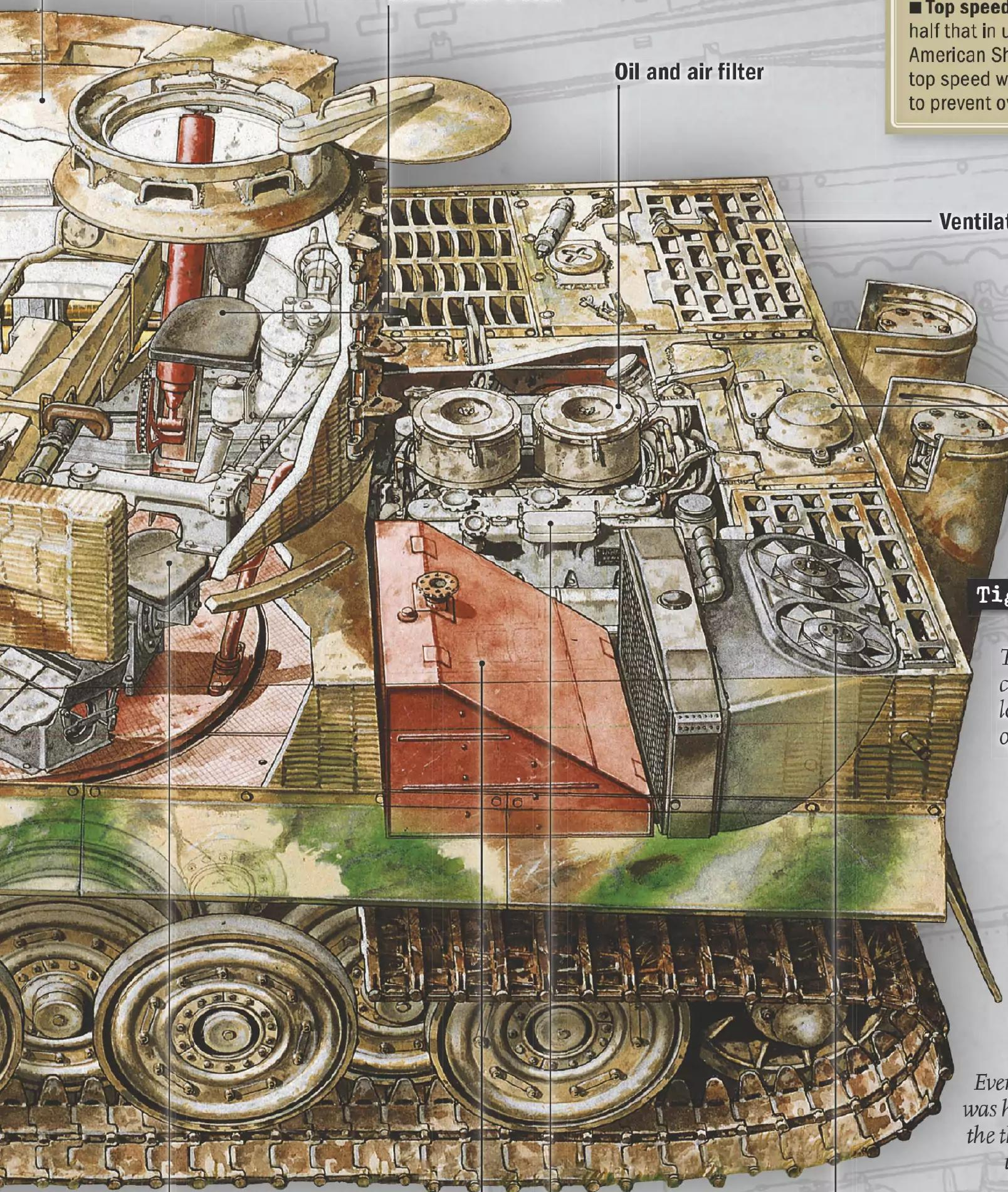
The **caterpillar tracks** were extremely wide. The belts, measuring 72.5 cm, ensured that the heavy tank did not get hopelessly stuck in the mud.

With a little luck, a hand grenade could be slipped into a gun barrel.

The turret weighed 11 tonnes and rotated very slowly – it took about a minute to turn 360 degrees. It was actually quicker to turn the whole tank.

EASY TO ROTATE

- **The hydraulic steering system** meant that the caterpillar tracks could drive each way, and the Tiger could turn on its axis in just 3.44 metres.
- **Top speed** was 45.4 kilometres per hour and about half that in uneven terrain. The Soviet T-34 and the American Sherman were only slightly faster. The Tiger's top speed was later reduced to 38 kilometres per hour to prevent overloading the engines and gears.



The snorkel and watertight hull allowed the Tiger to ford rivers 4.5 metres deep. Only the first 495 Tigers were equipped with snorkels.

The crew consisted of a commander, gunner, loader, driver and radio operator.

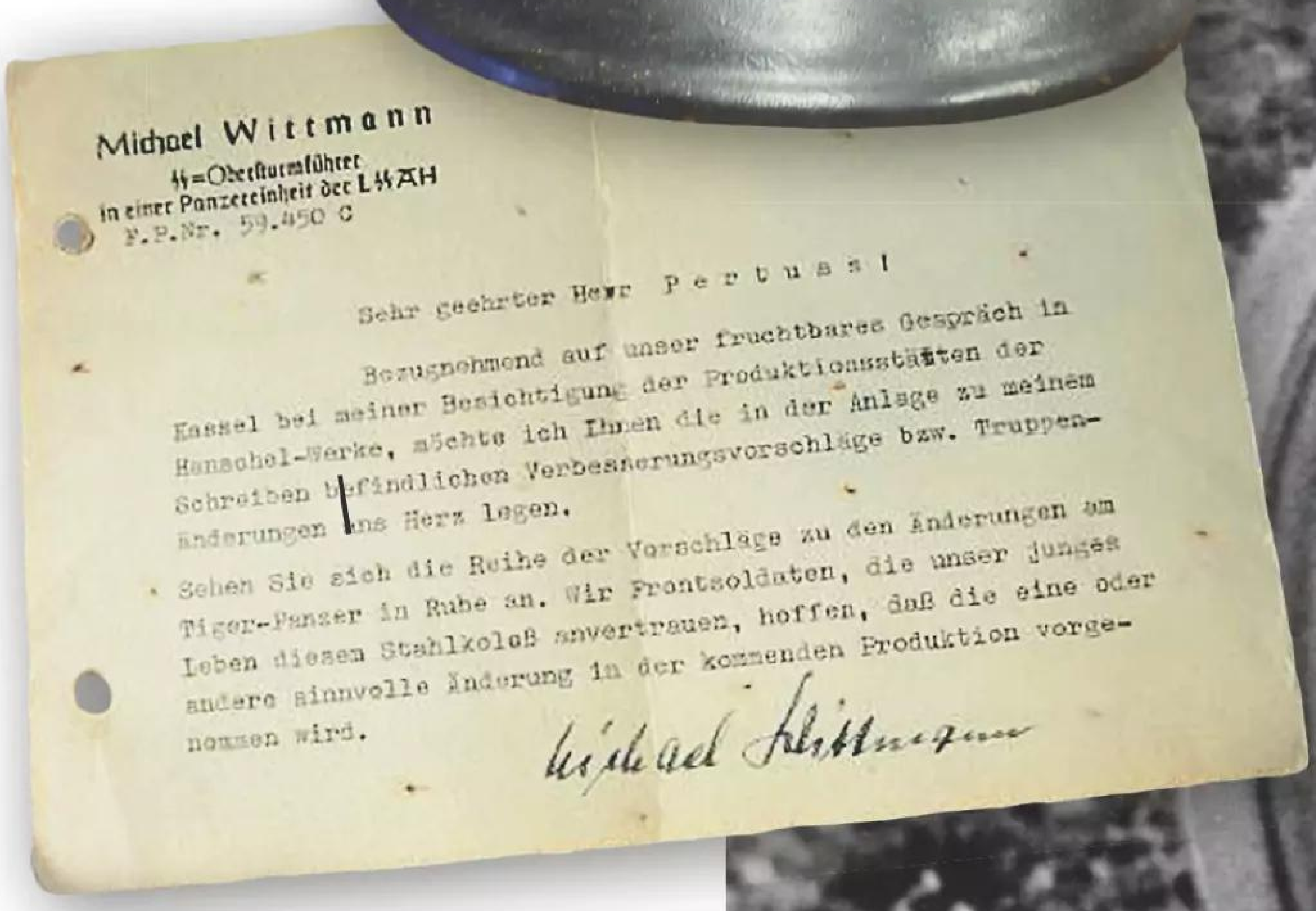
The engine was perfect for a lighter tank, but barely sufficient for the Tiger's weight. After 250 had been built, the engine was upgraded.

Even if the Tiger was hit by a shell, the thick armour usually held.

The Tiger's efficient 88-mm gun was the same type used by anti-aircraft units.

"Tigers and Panthers don't eat hay", exclaimed a German officer despairingly in the winter of 1944. Another problem was the weight of the tanks, which tested the Tiger's suspension, gearbox and other vital parts to the extreme. Uneven terrain, high speeds or long stretches often caused the mechanics to break completely. In fact, a Tiger tank rarely managed a long march without breaking down.

The mechanical problems were a big deal for the Germans, and it was not long before the Allies discovered their weaknesses. For example, in the summer of 1944 British soldiers found some broken-down Tigers in Italy. The discovery caused quite a stir among British Army commanders, who had been looking for a way to defeat the tank. They set up a group to investigate the tanks, and in August they came to a somewhat surprising conclusion in the report "Who killed the Tiger?" It killed itself.



Michael Wittmann
ᛋᛋ=Obersturmführer
in einer Panzereinheit der LᛋᛋAH
F.P.Nr. 59.450 C

Sehr geehrter Herr Pertuss!

Bezugnehmend auf unser fruchtbares Gespräch in Kassel bei meiner Besichtigung der Produktionsstätten der Henschel-Werke, möchte ich Ihnen die in der Anlage zu meinem Schreiben befindlichen Verbesserungsvorschläge bzw. Truppenänderungen ans Herz legen.

Sehen Sie sich die Reihe der Vorschläge zu den Änderungen am Tiger-Panzer in Ruhe an. Wir Frontsoldaten, die unser junges Leben diesen Stahlkoloß anvertrauen, hoffen, daß die eine oder andere sinnvolle Änderung in der kommenden Produktion vorgenommen wird.

Michael Wittmann

Michael Wittmann wrote a letter to the Henschel plant with suggestions for improvements of the Tiger.

The Wehrmacht had spent years trying to keep the Tiger's technical problems secret. But the mechanics were a constant headache for the tank drivers. For example, they had to lift the 11-tonne turret with a crane to replace the gearbox. In addition, there didn't have to be much frost on the Eastern Front's slippery roads before the mud froze between the wheels. Often the crew had to remove the massive wheels to scrape them free of ice. Such repairs were time-consuming and awkward in perfect conditions. On an ice-cold and muddy battlefield, the task was almost impossible. Many Tiger drivers had to reluctantly blow up their valuable tanks and walk away on foot, so the enemy wouldn't get hold of them.

The problems led to the German tank battalions never having the luxury of enough combat-ready Tigers to strike a decisive blow. At the same time, they were hampered by a lack of skilled commanders. Therefore, young and inexperienced officers were often given command of a Tiger with the message: "Be careful, you've got a million marks and three ▸

> **"The engine of the Panzer is a weapon just as the main-gun"**
>
> Heinz Guderian, German general and tank commander

In a break in the midst of war, a Tiger radio operator makes sandwiches for himself and his comrades.

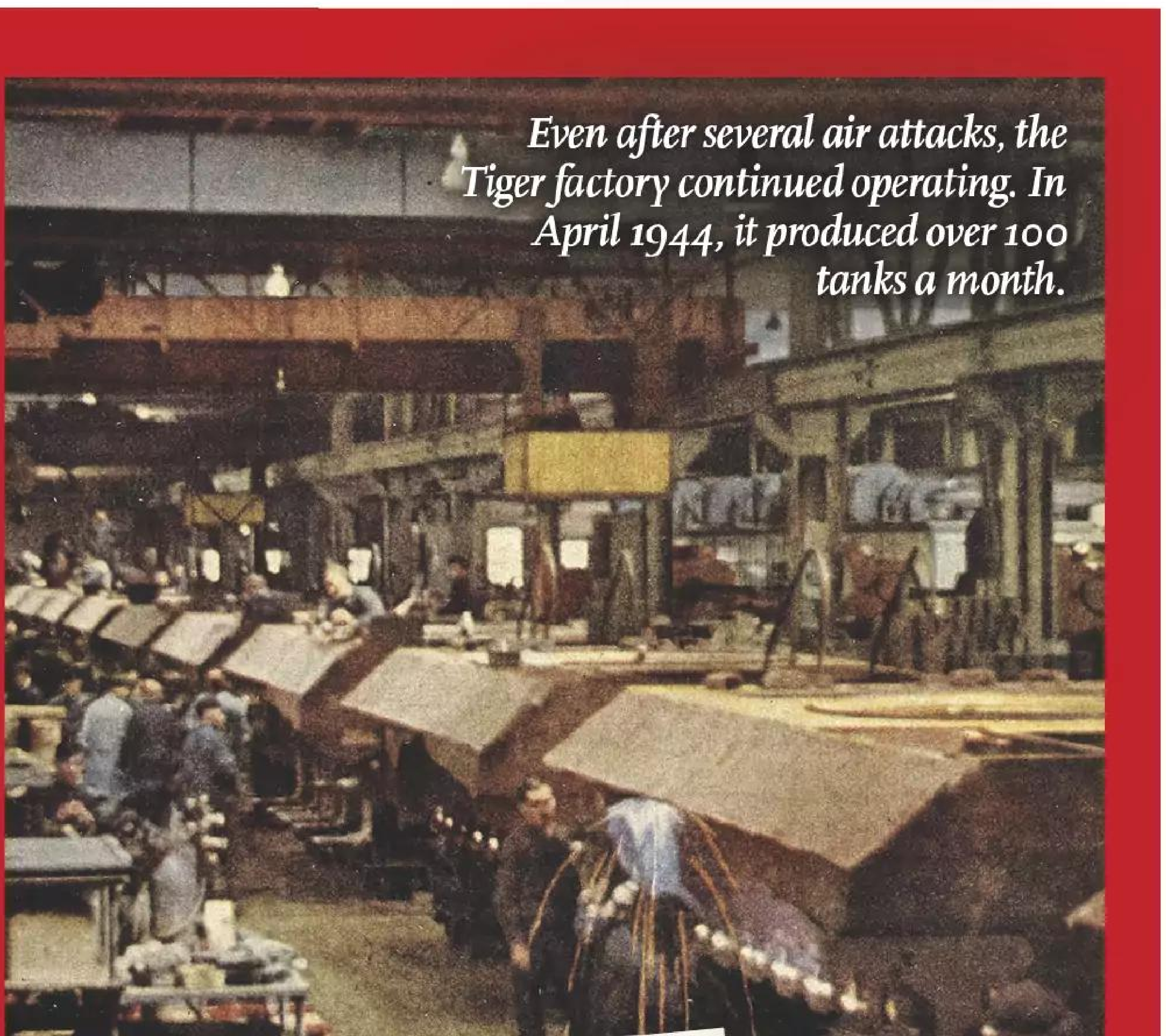
Factory supplied tanks to the end

The city of Kassel was the centre of Tiger production. The German arms manufacturer Henschel & Sohn built tanks until April 1945.

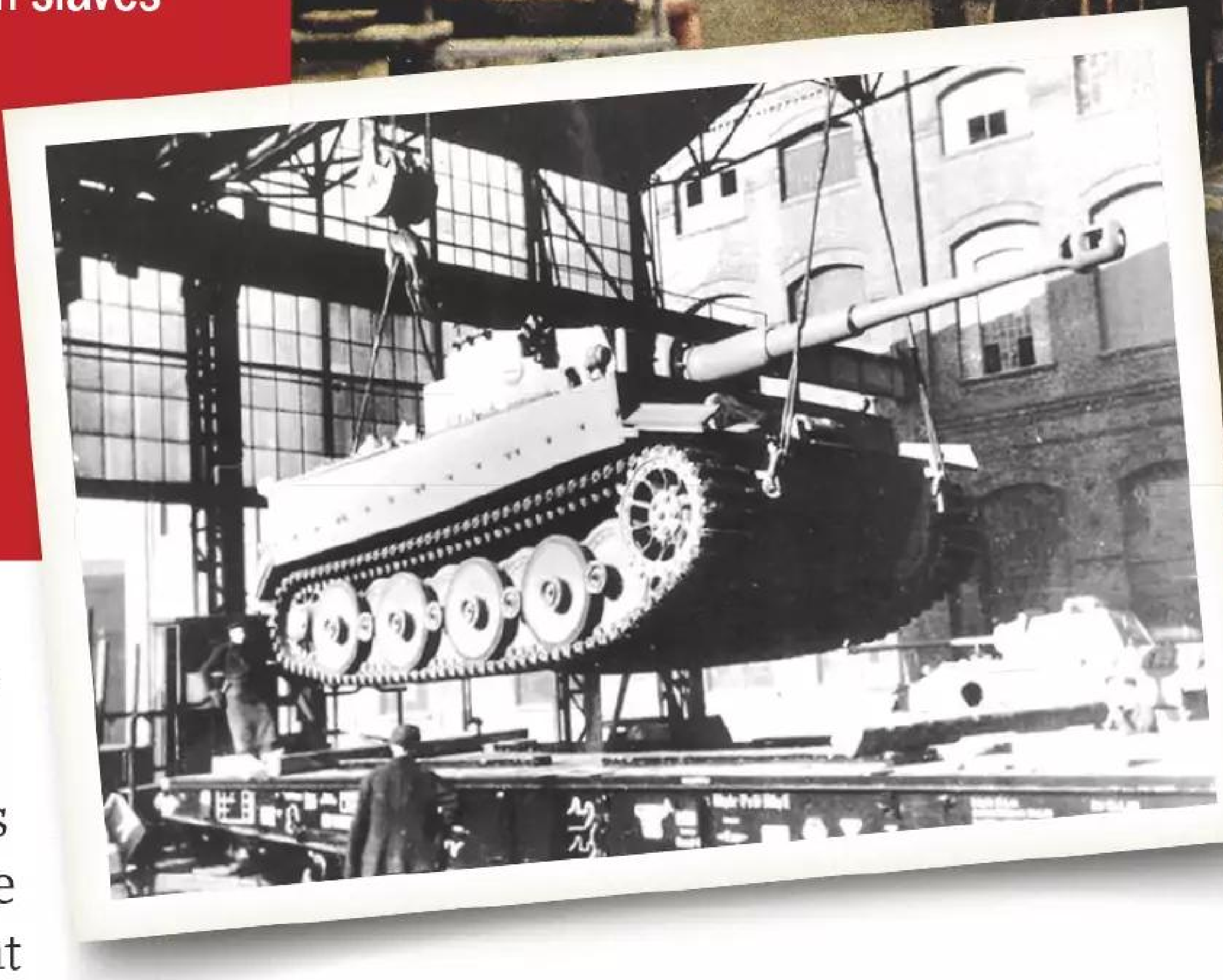
The Tiger was so packed with advanced mechanics that Henschel & Sohn factory in Kassel took 300,000 man hours constructing a single tank. This was double the production time of other German tanks.

In 1942, the Kassel plant only produced about 25 units a month, which failed to cover the German Army's demand. Therefore, the factory had to switch to manufacturing seven days a week, and in April 1944 it produced over 100 Tigers a month. More than 8,000 men were in work and many of them were Jewish slaves who were worked to death.

On 1st April, 1945, the American army reached Kassel, but Henschel & Sohn continued undeterred and delivered 13 Tigers the same day to two German companies. On 4th April, the Americans finally captured Kassel and production stopped forever.



Even after several air attacks, the Tiger factory continued operating. In April 1944, it produced over 100 tanks a month.



A finished Tiger is loaded on a railway car in Kassel in 1942.

and a half million working hours under your arse".

The men's inexperience resulted in many Tigers simply breaking down because they were overloaded. Often they did not even reach the front before they broke down. Fortunately for the Nazis, a significant number of tank commanders weren't incompetent. Wittmann destroyed a total of 138 enemy tanks – but even his luck couldn't hold forever.

Wittmann died with the Tiger

In 1944 Wittmann was sent to north-western France, where on 8th August, 1944 the Allies launched a major offensive.

Wittmann went to help the German soldiers against the superior force they faced, but after only one hour of battle his Tiger was in flames. When the tank exploded from the inside, the pressure was so violent that the 11-tonne turret was blown off.

The great Nazi hero died together with his men, and his death sent shock waves through the battalion.

Most battle-ready Tigers were wrecked over the following month. Some were destroyed by fierce shelling, but a great many were blown to pieces by the German army. Spare parts and fuel were now impossible to come by, and the Germans refused to let the precious tanks fall into enemy hands.

The Tiger II arrived too late

Neither could the Tiger II reverse the war for the Germans. The updated version of the Tiger was as difficult to produce as its predecessor, and Henschel & Sohn only built 492 Tiger IIs. They were too few to have a decisive influence on the war.

The Tiger II was first put into service in July 1944, and was reputedly used during combat in Normandy, where Allied troops began their liberation of Europe. On the Eastern Front, Tiger II first participated in sorties in August of the same year – far too late to stop the Soviets' rapid advance.

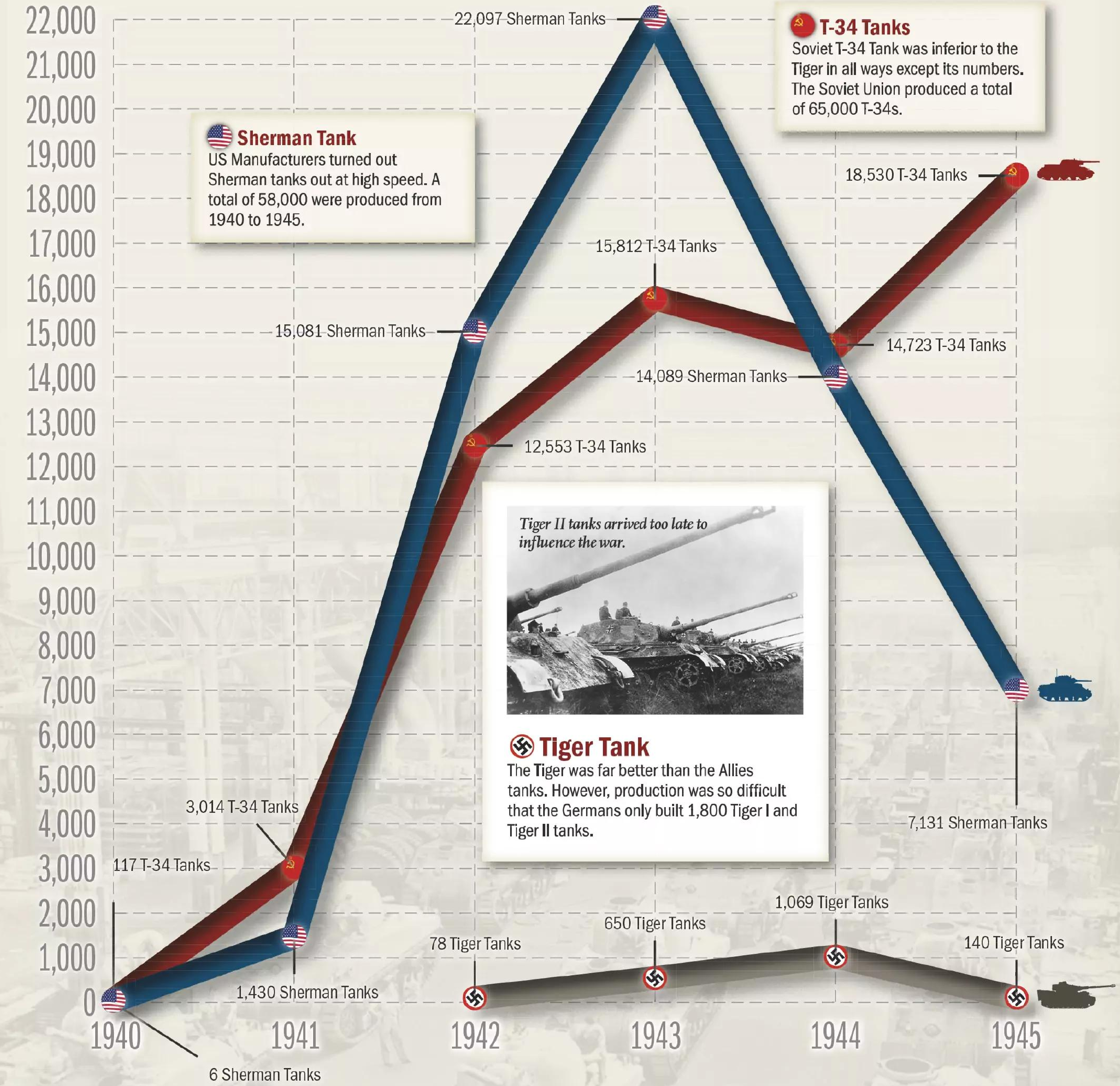
When Nazi Germany finally surrendered in 1945, the few remaining Tigers were shown to have no value for the Allies – they required too many expensive spare parts. Therefore, Tiger production never resumed – despite its superior strength.

> **"He was a fighter in every way, he lived and breathed action"**
>
> SS-Obergruppenführer Josef "Sepp" Dietrich after Michael Wittmann's death

Greater numbers won over size

Every Tiger wiped out an average of 5.74 enemy tanks. But the tank couldn't turn the war when the United States and the Soviet Union built up a combined total of 123,000 Sherman and T-34 tanks to counter the 1,800 German Tigers.

Michael Wittmann received a series of honours for his kills as Tiger commander.



Sherman Tank
US Manufacturers turned out Sherman tanks out at high speed. A total of 58,000 were produced from 1940 to 1945.

T-34 Tanks
Soviet T-34 Tank was inferior to the Tiger in all ways except its numbers. The Soviet Union produced a total of 65,000 T-34s.

Tiger II tanks arrived too late to influence the war.

Tiger Tank
The Tiger was far better than the Allies tanks. However, production was so difficult that the Germans only built 1,800 Tiger I and Tiger II tanks.

The Sherman plants in the United States mass-produced tanks, which the British also had access to.

Monty's general

From mediocrity at Sandhurst to leading roles during **El Alamein and Operation Market Garden** – this summarises the meteoric rise of Brian Horrocks, commander of XXX Corps and one of Bernard Montgomery's favourite generals.

Text: **DAVID GUDMUNDSSON**

Lieutenant General Brian Horrocks experienced several of the 20th century's most dramatic events. He was severely injured in both world wars and was a prisoner of war in Germany and Russia. He took a great deal of credit for the Allies victory in North Africa and Europe during World War II, but has often remained in the shadow of his famous chief, Bernard Montgomery.

Horrocks was born in 1895 in India. His father, Colonel William Horrocks, was a physician in the Royal Army Medical Corps. During his school career back in Britain, Horrocks proved a rather mediocre student. His time at Sandhurst Military College was undistinguished outside of sport. When it came to the exam results in the summer of 1914, it was not even certain that he would get an officer's commission.

But then the Great War broke out and all cadets were ordered into active service. Military Officer Horrocks joined the Middlesex Regiment and took part in the fighting during the British retreat from Mons. In October 1914 he was wounded by a bullet to his stomach and was taken into German captivity.

"Many experts believe Horrocks should be mentioned in the same breath as Brooke, Slim, Alexander, Wavell and Montgomery."

As soon as he recovered, Horrocks began to plan and carry out escape attempts. At one point, he was ►

Lieutenant General Brian Horrocks instructs men from XXX Corps using a map board which he often brought with him. Rees 1945.

IMPERIAL WAR MUSEUM

only 500 metres from the Dutch border when he was captured. For a while he was imprisoned with a group of Russian officers, where he learned to speak Russian. Despite numerous escape attempts, Horrocks remained captive. Eventually he was promoted to lieutenant, and after the war was awarded the Military Cross for his resistance during captivity.

After World War I, Horrocks was awarded the Military Cross.

Back from Germany, Horrocks learned that the army sought Russian-speaking volunteers for an expedition to Russia. In April 1919, he found himself in Vladivostok. From there he escorted a train loaded with equipment to the White Army in Omsk, 750 kilometres further west along the Trans-Siberian railroad. Horrocks was later posted to a training camp for the White Army in Yekaterinburg (where the tsar's family had been murdered a year earlier). But the Red Army was hard to stop. Horrocks had almost returned to Vladivostok before he was caught for a second time. He contracted typhoid fever, and for several days hung between life and death before the disease subsided.

It wasn't until the autumn of 1920 that Horrocks was set free. He rejoined the regiment, which was now stationed in Germany, and was promoted to captain. After two short periods in Ireland and in Silesia, the regiment returned home in 1923, and for the first time Horrocks could live an officer's life in peacetime. Among other things, he took up the modern pentathlon, competing successfully in army tournaments and even made the British Olympic team in Paris in 1924. He married Nancy Kitchin and the couple had a daughter.

PLANET NEWS ARCHIVE/SSPL/GETTY

Brian Horrocks and Nancy Kitchin at their wedding in 1928.

At the end of the 1920s – and encouraged by his father – Horrocks sought admission at Staff College, Camberley. Undergoing a staffing course was almost mandatory for those who wanted to advance in a peacetime army. Horrocks had not been a gifted student in his youth, but this time he passed both the entrance examination and the course with good results. He followed this up with service at the War Office in the mid-1930s before being named adjutant of the 9th Battalion Middlesex Regiment before he was appointed brigade major of the 5th Infantry Regiment at Aldershot in 1937. He was amazed to be appointed an instructor at Staff College, which meant he was considered an officer with good prospects. There Horrocks demonstrated a special ability to inspire his audience, which was to later characterise both his military and civilian careers.

At the outbreak of war in September 1939, Lieutenant Colonel Horrocks' first assignment was to organise a shortened, more flexible officer training course. When the German Army invaded France in May 1940, he was sent to the front as Commander of the 2nd Battalion of the Middlesex Regiment – a machine-gun unit.

Machine-gun battalions were unusual in that they remained under direct command of a division, so Horrocks reported directly to then Major-General Montgomery. This would prove to be of critical importance to Horrocks' career. During the short-term campaign both men learned to appreciate the other's abilities to lead troops in the field.

> **"In August 1942, Horrocks [took] command of XIII Corps in North Africa"**

After a short time in France and just before the evacuation of Dunkirk, Horrocks was made brigadier. Back in Britain he assumed command of the 9th Brigade, which were part of the invasion defences along the English coast. In June 1941 he was appointed commander of 44th Division with the rank of acting major-general. Montgomery commanded the south-eastern defences, and again the two dovetailed well together.

It was slightly surprising when, in March 1942, infantryman Horrocks was appointed commander of the 9th Armoured Division. He didn't have much experience of armoured warfare, but hard work allowed him to adapt quickly, giving him a taste of the armoured troops' mobile tactics. He remained in the division for just six months – in August 1942, Horrocks was ordered to take command of the Eighth Army's XIII Corps in North Africa. Horrocks became lieutenant-general and corps commander without having led larger units in battle than a battalion. He was also given command of a corps with no war experience. Was he really the right man for this job? It would not take long before he was put to the test.

Behind the promotion were changes in the command order in the Middle East that Churchill had initiated in the summer of 1942, which had included Montgomery becoming Commander of the Eighth Army. It was he who asked for Horrocks as commander of XIII Corps.

A little earlier in July 1942, the first battle at El Alamein had taken place. At that time Montgomery's predecessor General Claude Auchinleck had

The crew of a British M3 Grant tank observes a wrecked German Panzer I at El Alamein in 1942.

WARARCHIVE/ALAMY/IBL

blocked Rommel's attempt to break through the Alamein line west of Egypt, the final defensive line before Alexandria and Cairo. A new attack was expected in August in the southern part of the Alamein line by a hill called Alam el Halfa. It became Horrock's responsibility to defend the hill with XIII Corps. The British plan was to conduct a purely defensive battle: they would let Rommel attack well-prepared positions where the main defences consisted of medium M3 'Grant' tanks.

Rommel acted exactly as expected. He tried to encircle the British line, but was met by minefields and a relentless pounding from tanks and anti-tank guns. The Axis was subject to extensive tank losses and also suffered from a lack of fuel. Rommel was forced to call off the offensive.

The main outline of the plan for the Battle of Alam el Halfa was neither Montgomery's nor Horrocks'; it was Auchinleck's. But it was Horrocks who implemented it. He had shown that he could handle both armour and desert warfare – and that he could command at corps level.

Alam el Halfa was also where Horrocks formed his dynamic way of leading his corps. Often he was far ahead at the front line in a remodelled Sherman tank with the gun removed, which he used both in the desert and later in Europe. Horrocks also deployed a jeep to conduct reconnaissance in front. In one case, the Germans directed mortar fire towards the place Horrocks was heading. As the driver slowed down, Horrocks asked what he was doing. The driver replied that he was waiting for the shelling to ease up. "Drive on," Horrocks replied. "If I want to go somewhere, no bloody German is going to stop me".

POPPERFOTO/GETTY

Bernard Montgomery made Horrocks corps commander at El Alamein. This picture shows Horrocks to the left of the bareheaded Montgomery.

In the Second Battle of El Alamein in October 1942, XIII Corps played a minor role. It conducted a diversionary attack on the southern section of the front while the main attack took place on the coast to the north. In contrast, Horrocks, now commanding X Corps, played a crucial role when the British broke through the strong Mareth line in Tunisia in January 1943, not least thanks to his ability to coordinate infantry and armoured troops in combat.

This attribute also played a key role in the less well-known – but equally hard – struggle in late winter 1943 when Horrocks took over XXX Corps. As a renowned corps commander with impressive results behind him, it should only have been a matter of time before Horrocks became ▶

general and commander of an entire army. But it was not to be.

In June 1943, during planning for the Allied invasion of Sicily, Horrocks went to Bizerta to watch 46th Infantry Division rehearsing its assault on Salerno. A single German fighter plane appeared through the smokescreen and strafed the ground. Horrocks was hit in the chest, lungs and stomach. It took 14 months before he could return to the battlefield. While Horrocks convalesced, the invasions of Sicily, Italy and Normandy took place. In August 1944 he returned to service. Again, Montgomery hand-picked him.

Horrocks and XXX Corps participated in the breakout of Normandy and the offensive through Belgium. In September 1944, Horrocks led his infantry in Operation Market Garden, the combined airborne and land offensive which, according to Montgomery, would be the decisive battle against German forces in the west. XXX Corps would break through the German front in the Netherlands and be linked to three airborne divisions that would occupy the bridges at Eindhoven, Nijmegen and Arnhem. The timetable was optimistic: XXX Corps would attack along a single road and reach the British Airborne Division in Arnhem in three days.

The operation did not go to plan. The US divisions achieved their objective, but only after delays. The closer to Arnhem the British came, the harder the German resistance, which included the II SS Panzer Corps. Arnhem remained "a bridge too far".

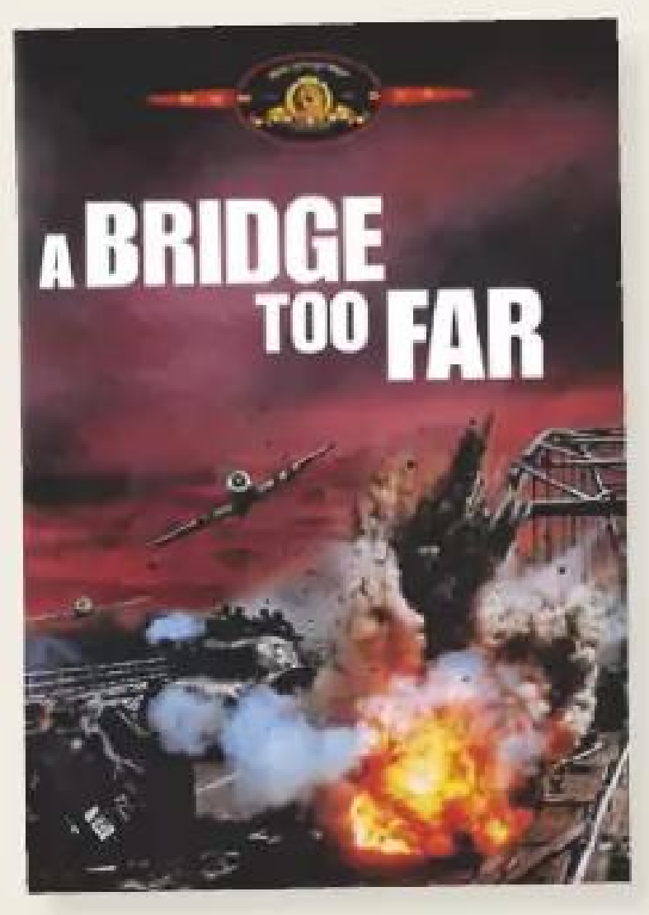
XXX Corps was accused of being slow on the trigger during this operation, and Horrocks was his own biggest critic. But the whole operation was a gamble, and even if it had gone to plan it's likely that XXX Corps would have had little opportunity to break German resistance around Arnhem no matter what.

The heavy fighting in which Horrocks often placed himself at the forefront took a lot out of him.

War experiences became TV and film fodder

★ Horrocks was fascinated by the development of mass media television, and in the mid-1950s suggested to the BBC that he should make a TV show about the battles he'd participated in during the war. The BBC were undecided but gave him the chance. Here, Horrocks' basic officer skills to make people listen and understand became a valuable commodity. When the battles he himself had participated in had been completed, he continued with programmes of other kinds and eventually about other wars. His picture even graced the front cover of the *Radio Times*.

Horrocks was also a military consultant during the recording of the film "A Bridge Too Far" (1977) about Operation Market Garden, where he was played by Edward Fox. A scene that captures Horrocks' leadership style well is where he explains the operation to the officers in XXX Corps.



"A Bridge Too Far" – the DVD cover.

British tanks are blasted at the transition of the bridge in Arnhem. Picture from the film "A Bridge Too Far", where Horrocks participated as military consultant.

MARY EVANS/IBL

WAR ARCHIVE/ALAMY STOCKPHOTO/IBL

General Horrocks in France in 1944. He became known for his active leadership style, happy to lead from a vehicle near the front.

> “XXX Corps was accused of being slow on the trigger during this operation”

Sometimes he was plagued by pain and fatigue because of past injuries. On Christmas Eve 1944, he was sent home on leave. Horrocks protested, but to no avail. Montgomery would spare him the heavy fighting expected when the Allies penetrated Germany.

During the Battle of Reichwald in February 1945, XXX Corps expanded to nine divisions – 200,000 men under Horrocks' command. On 23rd March the corps crossed the Rhine and in April took Bremen. XXX Corps liberated the concentration camp Stalag XB near Sandbostel and the compassion many had felt for the German civilian population after seeing the devastation in German cities, turned to indignation.

On 5th May Horrocks accepted the German surrender from the troops on their front. He then became commander of the occupation troops in the Hanover area. Despite the disgust of what he had seen in concentration camps, he was convinced that Germany had to be helped in order not to repeat the mistakes made between the wars.

As Horrocks spoke Russian, he occasionally also met representatives of the Soviet occupying power and was alarmed by the indoctrination he saw within Soviet officers. When Churchill held his famous “Iron curtain” speech, he echoed Horrocks' fullest fear of Soviet ambitions in Europe.

Horrocks' last military post was General Officer Commanding In Chief Western Command in Britain. Eventually, his health deteriorated, and he underwent several extensive operations. In 1949 he retired from the army.

One would think the 62-year-old veteran would now live a quiet life. He did so – for a few weeks. Later, he accepted an offer to become Black Rod in the House of Lords. Although an honorary position, which included ceremonial duties, in everyday life he supervised the administration of the Lords to ensure everything ran smoothly.

In addition to being Black Rod, which he did until 1963, Horrocks pursued an interest in writing. His autobiography *A Full Life* was published in 1960. In addition, he was editor of a wide range of regimental works. In 1977 he co-authored the book *Corps Commander* on the fighting in Western Europe from autumn 1944. His interest in the media also led him into television, where he became very popular through programmes based on his experience and historical battles.

IWM

XXX Corps' emblem.

Brian Horrocks died in 1985, aged 89 years old. His strongest impression on history is the victory in North Africa in 1942-43 and in North-west Europe in the winter and spring of 1945. Part of his greatness as a corps commander was the ability to lead infantry and armoured forces with an understanding of both. Another element was his flexibility, which enabled him to achieve victories both in defensive combat – as at Alam Halfa – as well as offensive battles, as at Mareth and Reichwald.

Many experts believe Horrocks should be mentioned in the same breath as Brooke, Slim, Alexander, Wavell and Montgomery as one of the best British generals during World War II. ✪

David Gudmundsson is a Swedish historian.

Further reading:
- ★ **A Full Life** (1974) by Sir Brian Horrocks
- ★ **Horrocks: The General Who Led from the Front** (2005) by Philip Warner.

RELIABLE, FLEXIBLE, ROBUST

When the United States developed a new tank during World War II, it looked for an easily produced, durable model in as few versions as possible. The result was the Medium Tank M4 – better known as the Sherman.

Text: **HARALD SONESSON**

The US Medium Tank M4 is one of the best known western Allied tanks of World War II. It's associated with the name 'Sherman' thanks to the British love of giving tanks names rather than model numbers. The tank was used from 1942 on all fronts during the war – even by the Soviets and Chinese – and remained in service until the late 1980s. It was also the base model for many modifications and variations both during and after the war.

The development of armoured vehicles had not been given a high priority in the US during the interwar period. In 1939 the US Army was still largely in the mindset of World War I. Indeed, in some respects, one could even look back to before 1914 to understand how the US saw its needs. Infantry forces remained the priority, and those vehicles that were developed were considered supporting players. Any thoughts about armoured vehicles tended towards looking at them as mechanised cavalry: light and fast. A similar situation existed in the UK. Germany's blitzkriegs in Poland in 1939 followed by Belgium and France in 1940 would prove an unpleasant wake-up call.

THE MEDIUM TANK M4 had its roots in the medium heavy T5 prototype, developed in 1938. The T5 became the Medium Tank M2 when it was put into production in 1939 and quickly evolved into the Medium Tank M3 (two variations of which were dubbed 'Lee' and 'Grant' respectively). The M3 was designed quickly as a tank capable of being equipped with a 75-mm gun, which was considered necessary in the summer of 1940 after developments in Europe. It was Major General Adna R Chaffee, head of the newly created Armoured Force in July

A Sherman M4A1 (rounded, sloping chassis) and a Sherman M4A3 (welded, angled) struggle through soft ground. The M10 tank destroyer at the rear was built on a modified M4 chassis. Luxembourg, 1944.

POPPERFOTO/GETTY

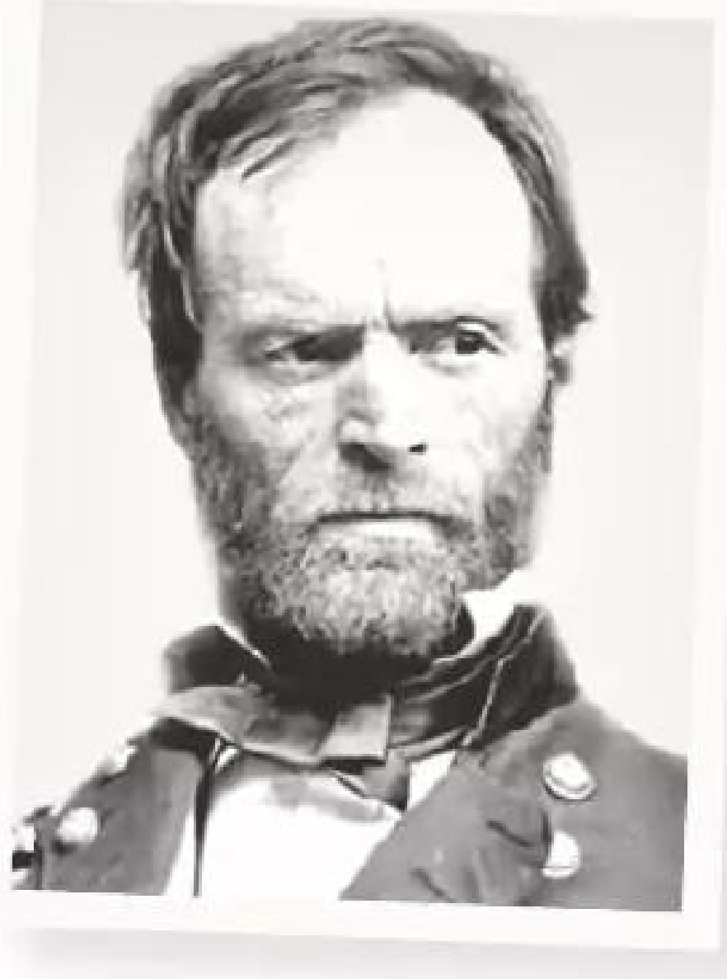
“IT [THE M4] REMAINED IN SERVICE UNTIL THE LATE 1980S.”

1940, who played a key role in determining the requirements for future medium heavy tanks. It wasn’t possible to place such a large gun in the turret, which is why it was mounted on a sponson casemate attached to the hull when production started in June 1941. Since the M3 was a temporary solution, work started simultaneously on developing a medium heavy-duty tank with a 75-mm gun in the turret that could be rotated 360 degrees.

IN APRIL 1941 five different options were presented. The one picked was easiest to produce quickly in large volumes. It comprised a modified M3 chassis with a hull that was either welded or cast. A new turret that was adapted to the 75-mm gun was placed on top of the design. The tank’s carriage was high to accommodate the favoured main engine. In February 1942 the first Medium Tank M4 was delivered; by September, the British Eighth Army received 300 tanks and in October during the Second Battle of El Alamein, it was put into combat for the first time. During the Operation Torch landings in North Africa the following month, US combat forces also fought for the first time with Sherman tanks.

ECHOING ITS SOVIET allies, but in direct contrast to the German approach, the US Army focused on standardising development and production for as few variations as possible. Lieutenant General Lesley McNair established several principles. First, the tanks had to be resilient and reliable so that they could cope with stresses without requiring too much service and maintenance.

Since the US could be expected to get into battle very far from home, parts were as standardised as ►



The M4 was named after the Union Army general William Sherman (1820-91) from the US Civil War.

possible to avoid potential chaos when dealing with spares, repair equipment and the like. Both the deployment of new and existing upgraded equipment should only be countenanced if battle conditions clearly demonstrated a need, and if the responsible commanders in the field specifically demanded it.

THE US VIEW of armoured forces put the main emphasis on their use after breaking through enemy lines. One would then deploy tanks against command staff and support forces. Battles between tanks were not the armoured divisions' main focus. This meant that their main tanks – specifically the medium-heavy Sherman – were to be fitted with a gun that was primarily best for deploying explosive shells, with its effectiveness against tanks of secondary concern.

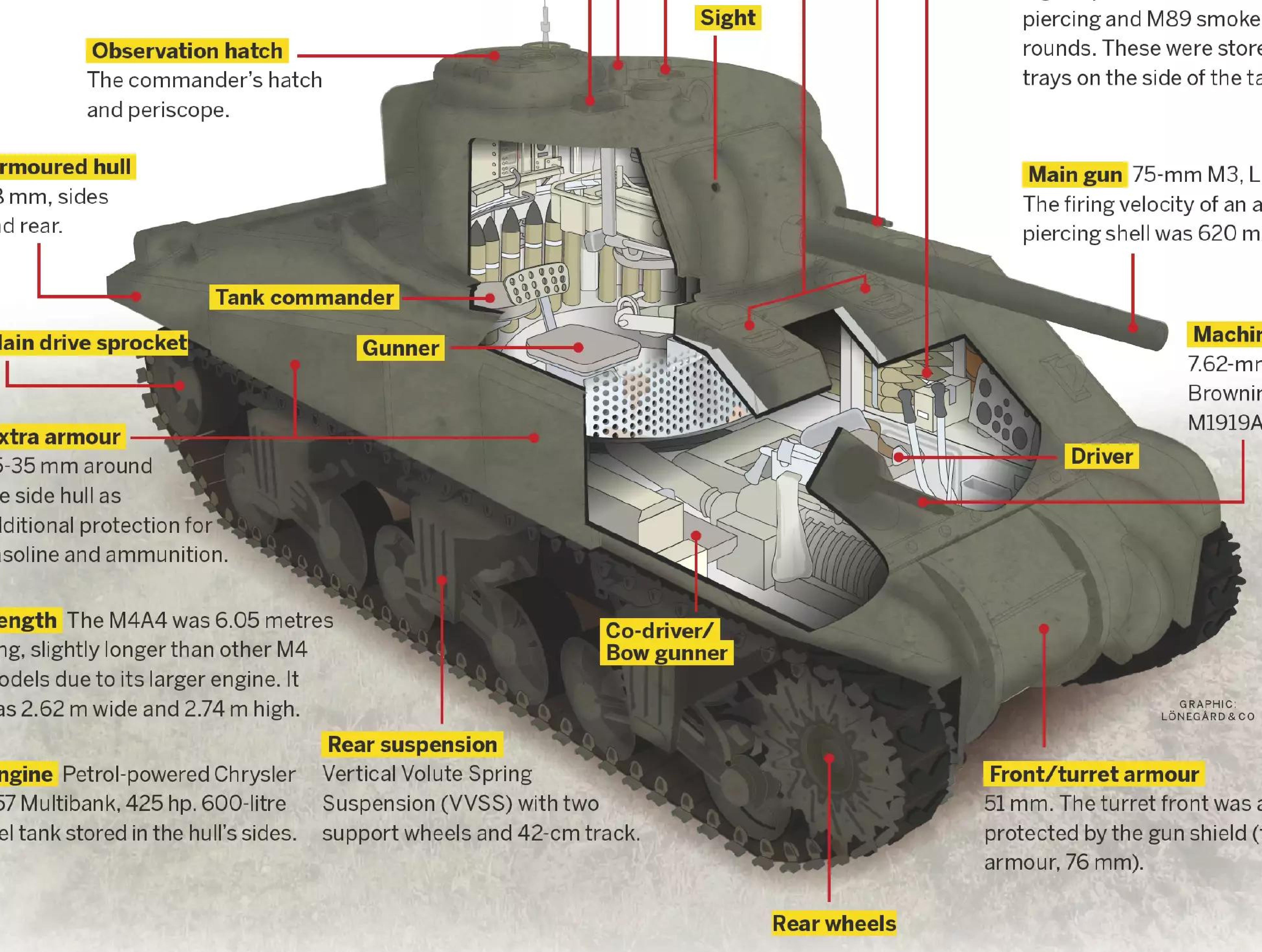
Just like the early versions of the German Panzer IV, the Sherman was equipped for indirect fire. The independent tank battalions whose primary goal was to support infantry forces, would happily sacrifice some mobility in return for stronger armour to resist German firepower. As things stood, it had to be accepted that the new tank was a compromise between protection, firepower and mobility.

NEARLY 50,000 MEDIUM Tank M4s were produced from early 1942 until the summer of 1945. Around 17,000 were delivered to Britain during the war, while the Soviet Union received just over 4,000. The tank was built in several different models, the main differences being which engine was used or whether the upper part of the hull was cast or welded.

All variants were equipped with the original 75-mm gun, but several received the newer – and more effective – 76-mm gun mounted in a new and larger

Cramped turret

★ There was little space in a Sherman M4A4 (75). The gunner and tank commander sat on the right of the main gun; the loader on the left. The loader handled the machine gun and radio behind the turret.



Mount For 12.7-mm Browning M2 machine gun.

Hatches For driver and bow gunner.

Turret machine gun 7.62-mm Browning M1919A4.

Ammunition A total of 97 rounds, divided between M48 high explosive, M61 armour-piercing and M89 smoke rounds. These were stored in trays on the side of the tank.

Observation hatch The commander's hatch and periscope.

Armoured hull 38 mm, sides and rear.

Main gun 75-mm M3, L / 40. The firing velocity of an armour-piercing shell was 620 m/s.

Machine gun 7.62-mm Browning M1919A4.

Extra armour 25-35 mm around the side hull as additional protection for gasoline and ammunition.

Length The M4A4 was 6.05 metres long, slightly longer than other M4 models due to its larger engine. It was 2.62 m wide and 2.74 m high.

Engine Petrol-powered Chrysler A57 Multibank, 425 hp. 600-litre fuel tank stored in the hull's sides.

Rear suspension Vertical Volute Spring Suspension (VVSS) with two support wheels and 42-cm track.

Front/turret armour 51 mm. The turret front was also protected by the gun shield (total armour, 76 mm).

GRAPHIC: LÖNEGÅRD & CO

> **"THE TANKS HAD TO BE RESILIENT AND RELIABLE... TO COPE WITH STRESSES WITHOUT REQUIRING TOO MUCH SERVICE AND MAINTENANCE."**

turret. Two models were also produced with a 105-mm howitzer in the turret. Several changes were made to the construction during the war, partly to simplify production, but also to improve its armour, action and movement.

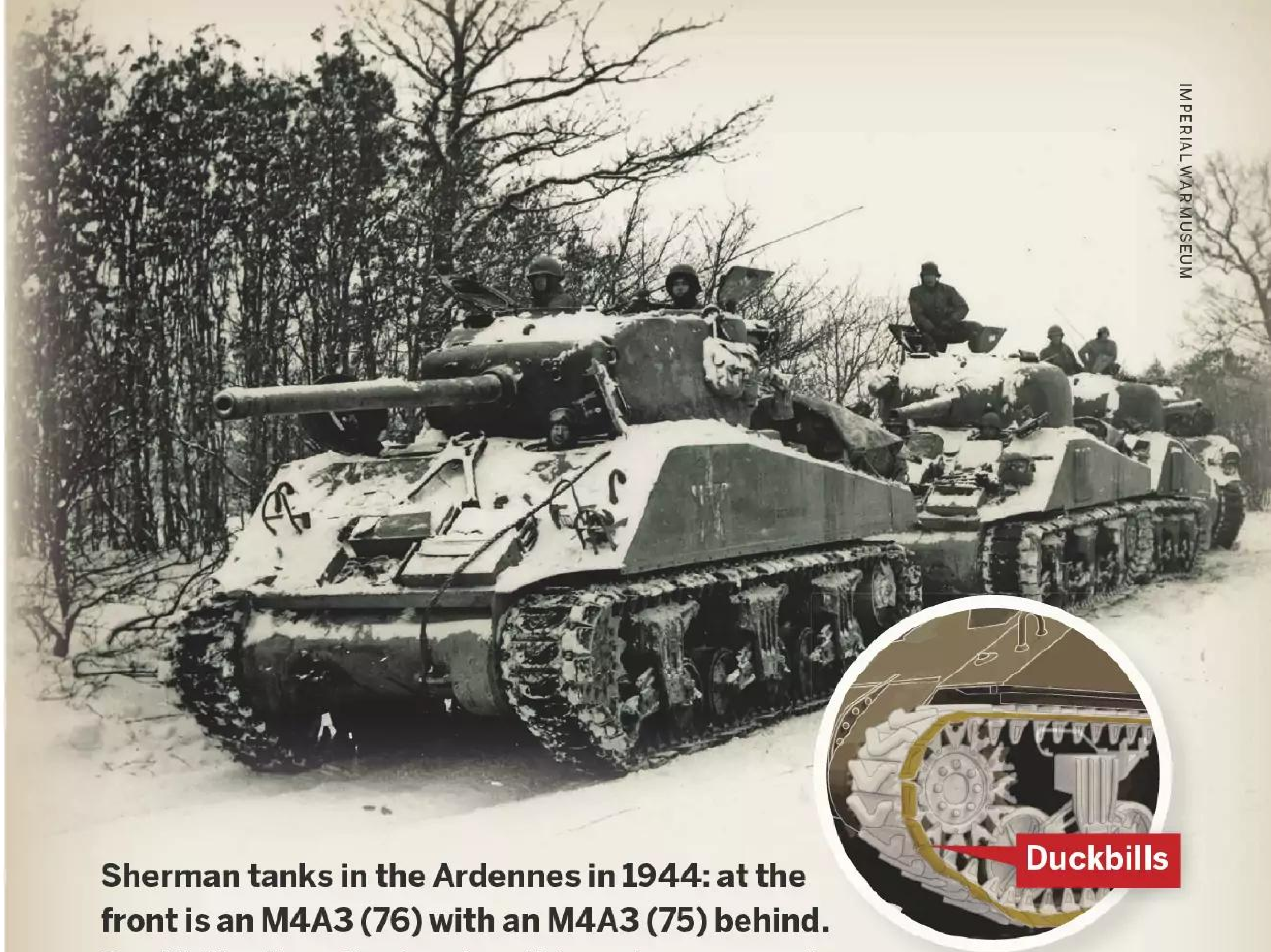
THE M4 HAD a crew of five: tank commander, gunner, loader/radio operator, tank driver and co-driver/machine gunner (known as the bow gunner). The latter two sat in the front of the hull while the others were found in the turret with the loader to the left of the gun and the gunner and tank commander on its right. In later models, everyone other than the gunner had access to a separate hatch to get out of the tank. On early tanks there was just one hatch in the turret shared between the commander, loader and gunner. In situations where one needed to quickly evacuate the turret, there was obviously a problem.

The tank was equipped with a radio transmitter and receiver as well as internal communication facilities for the entire crew. Some early M4s were only equipped with a receiver. These were never used by the battalion commander or his deputy.

The commander's observation abilities were hampered with the turret hatch closed. In the observation hood there was a rotating periscope that provided his only means of seeing what was happening outside. On later models an observation hood was introduced with six sieve-like openings of laminated glass, with a periscope or binoculars in the turret itself.

As a result, tank commanders – like their German counterparts – chose to poke their heads outside whenever possible during battle. Once the hatch closed, their ability to perceive what was going on dropped dramatically. On some models, the tank commander had the opportunity to quickly correct the gunner using a handle on his right-hand side to rotate the turret and override the gunner. A heavy outer machine gun was mounted in such a way that the tank commander could quickly open fire on a target before the gunner had it in his sights – that was the theory. On some later variants, the machine gun was moved to the gunner's hatch, or placed just behind the turret hatches.

Various models of the M4 offered different targeting mechanisms for the gunner. Normally, ▶



IMPERIAL WAR MUSEUM

Sherman tanks in the Ardennes in 1944: at the front is an M4A3 (76) with an M4A3 (75) behind. Duckbills sit on the track unit to reduce ground pressure and the risk of getting stuck on soft ground.

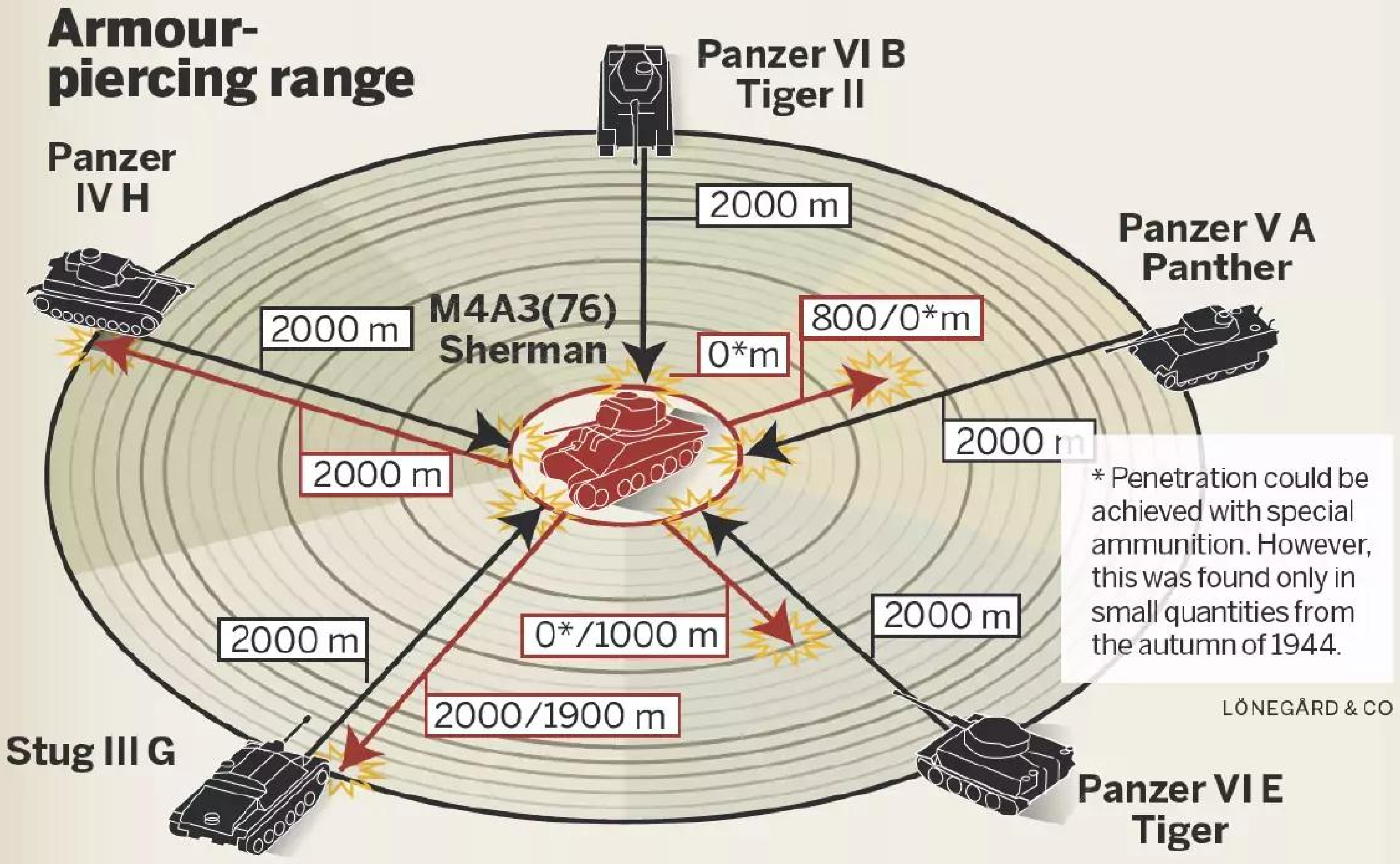
On the battlefield

Comparison with enemy tanks

Tanks *Sherman and regular opponents at different times.*	**Armament** *L value indicates length of barrel relative to calibre.*	**Armour (mm) in front, turret/hull** ** sloping armour (more protection).*	**Year entered service**	**Horsepower (per tonne)**	**Ground pressure (kg/cm^2)**	**Range (km) on road / off-road**
M4A3(76)	**76-mm L/55**	**89/64***	**1942**	**15.1**	**1.05**	**200/145**
StuG III G *	75-mm L/48	80/80	1943	12.6	1.05	155/95
Pz VI B Tiger II	88-mm L/71	180/100–150*	1944	10.1	0.78	170/120
Pz IV H	75-mm L/48	50/80	1943	10.6	0.89	188/134
Pz V A Panther	75-mm L/70	100/80*	1943	15.6	0.73	200/100
Pz VI E Tiger	88-mm L/56	100–110/100	1942	12.3	0.74	195/110

* StuG III lacked a turret, but had a distinction between the upper and lower part of the hull.

Armour-piercing range



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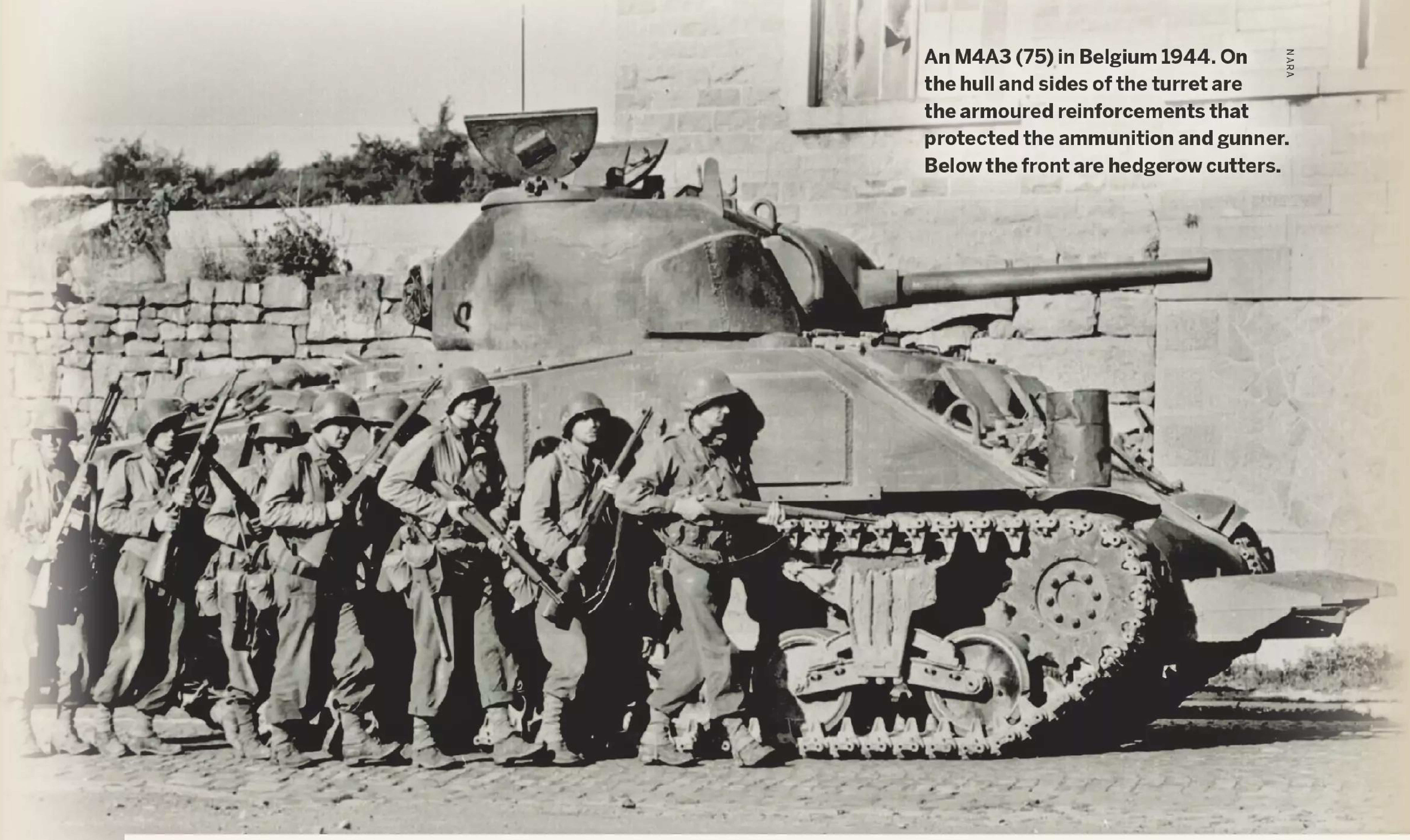
★ The diagram shows the approximate strike distance of the Sherman M4A3 (76) and German combat vehicles it commonly fought. The numbers refer to a strike on the front of the enemy's hull. Where the thickness of the front panel varies, two numbers (turret/hull) are indicated. In fact, the battle distance was often significantly smaller. It was influenced by the weapon's effect, visual optics, armour quality and ammunition type.

A tank of many models

The M4 tank did not follow a pattern of uniform development like the German *Ausführung*. Instead, the model variant names were obtained from the different manufacturers.

The order of the models was checked when they were approved for production. They had different hulls and engines. Based on various changes in the model, some tanks received E-designations.

Early in 1944, the main armament on three models was switched to a 76-mm gun. At the same time, other changes were made: a new and larger turret, a new front hull, larger hatches for the driver and machine gunner as well as transport support for the gun and new wet storage for ammunition. The tanks with these changes became version E4. They were also called "A(76)" to display the armament. The first 76-mm gun had no recoil brake, which was added to later versions.



An M4A3 (75) in Belgium 1944. On the hull and sides of the turret are the armoured reinforcements that protected the ammunition and gunner. Below the front are hedgerow cutters.

NARA

M4A3 – US Army's main tank

Model	Production period	Number manufactured	Armament	Armour on front and turret/hull (mm)	Weight (tonnes)	Horsepower / tonne	Ground Pressure (kg / cm²)
M4A3(75)	Jun 42-Mar 45	4,760	75-mm/L40	89/51 (89/64)	30.3 (31.6)	16.5 (15.8)	0.96 (1.00)
	Fifth model. 3,070 of them were manufactured with wet ammunition storage and thicker armour (in brackets, above). The model had a Ford V8 engine with 500 hp. 3,039 M4A3s were also produced with a 105-mm howitzer.						
M4A3(76)	Feb 44–Dec 44	4,542	76-mm/L55	89/64	33.2 (33.7)	15.1 (14.9)	1.05 (0.77)
	Models had wet storage. Afterwards, HVSS belt assemblies and wider belts (58 cm over 42 cm) were introduced. These models were designated as M4A3E8 (figures in brackets) and were the final version of the tank.						
M4A3E2	May 44–Jun 44	254	75-mm/L40	178/102	38.1	13.1	1.00
	An Assault Tank with significantly thicker armour was nicknamed "Jumbo". Some models were rearmed in the field with 76-mm guns.						

he combined a direct-view scope with a periscope for a wider observation field. The gunner could detect a target through the periscope, then quickly switch to the telescope before opening fire on targets where more precision was required. This offered a clear advantage to the traditional solution, where he had just one, highly limited, field of view to look through.

THE LOADER USUALLY had more than enough tasks to get on with, from handling the ammunition for the main gun as well as the machine guns to operating the radio. When he was given an opportunity to observe, there was a 360-degree periscope mounted in the turret roof.

The range and number of guns and ammunition varied from model to model, and it was common to try and maximise a tank's firing abilities. Later tanks were fitted with a separate hatch for the loader and in some cases a machine gun was placed there. In addition to providing a quick means of escaping the tank, the loader could help with observation from his open hatch. On the loader's side of some models there was also a two-inch smoke mortar that he could fire manually to lay down covering smoke in front of the tank.

The driver sat in the front left section of the hull and steered using two levers between his legs. The gearbox offered five forward gears and one reverse. When the shutters were closed, the driver in early M4s could see partly through a viewport protected by laminated glass, and partly through a rotating periscope in his hatch.

On later models there were two periscopes: the rotating periscope being joined by one fixed in the forward position on the tank roof.

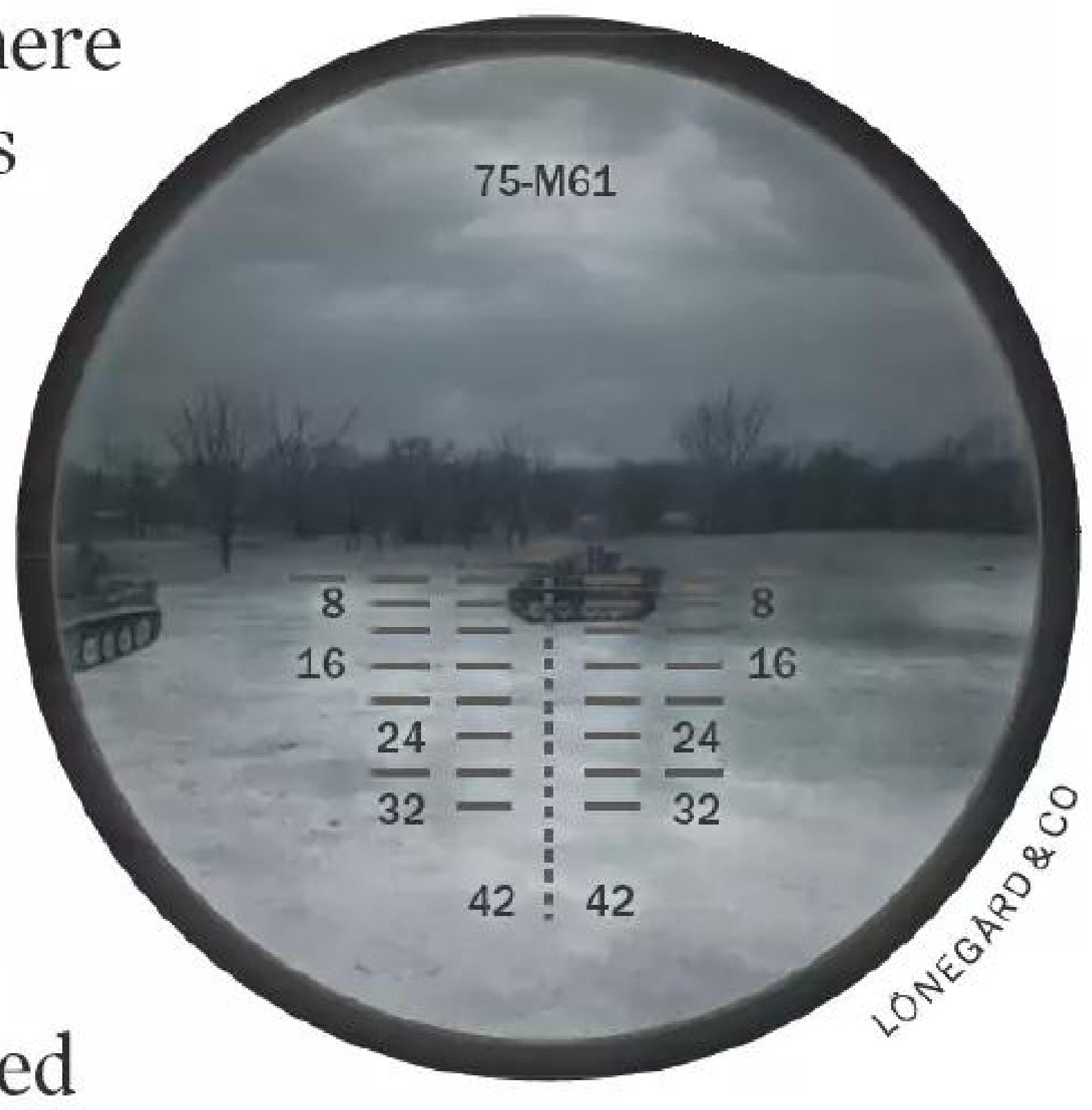
When performing prolonged manoeuvres, the driver could fit a pop-up hood consisting of a windshield that attached to the tank body. The windshield was even fitted with windscreen wipers and a defroster. The driver was also the tank's best mechanic, and so was responsible for maintaining the engine and drive unit.

"TANK COMMANDERS – LIKE THEIR GERMAN COUNTERPARTS – CHOSE TO POKE THEIR HEADS OUTSIDE WHENEVER POSSIBLE"

The bow gunner – or BOG to shorten the name when issuing orders – had the task of taking care of the machine gun mounted on the front of the tank. He was also a spare driver, needed to relieve the driver during long-distance journeys, and had the same observation equipment as the driver.

BRITISH SOLDIERS FIRST underwent a basic military education before being selected as tank personnel and sent to their regiment where specialist training took place. For many, this meant they had to wait over two years from enlistment before they were sent out in combat. Unlike German tank crews, they were given an opportunity to learn multiple tank functions and carry out multiple exercises. However, combat experience was only possible through actual battle.

US tanks personnel followed a similar path to the British system. There was limited capacity at the central training site in Fort Knox, so special training was often carried out in the units themselves. Training wasn't particularly realistic or up to date due to a lack of combat experience. To give the inexperienced personnel and crews as good a preparation as possible before they were sent out on active duty, those with practice in the field gave presentations on their experiences.



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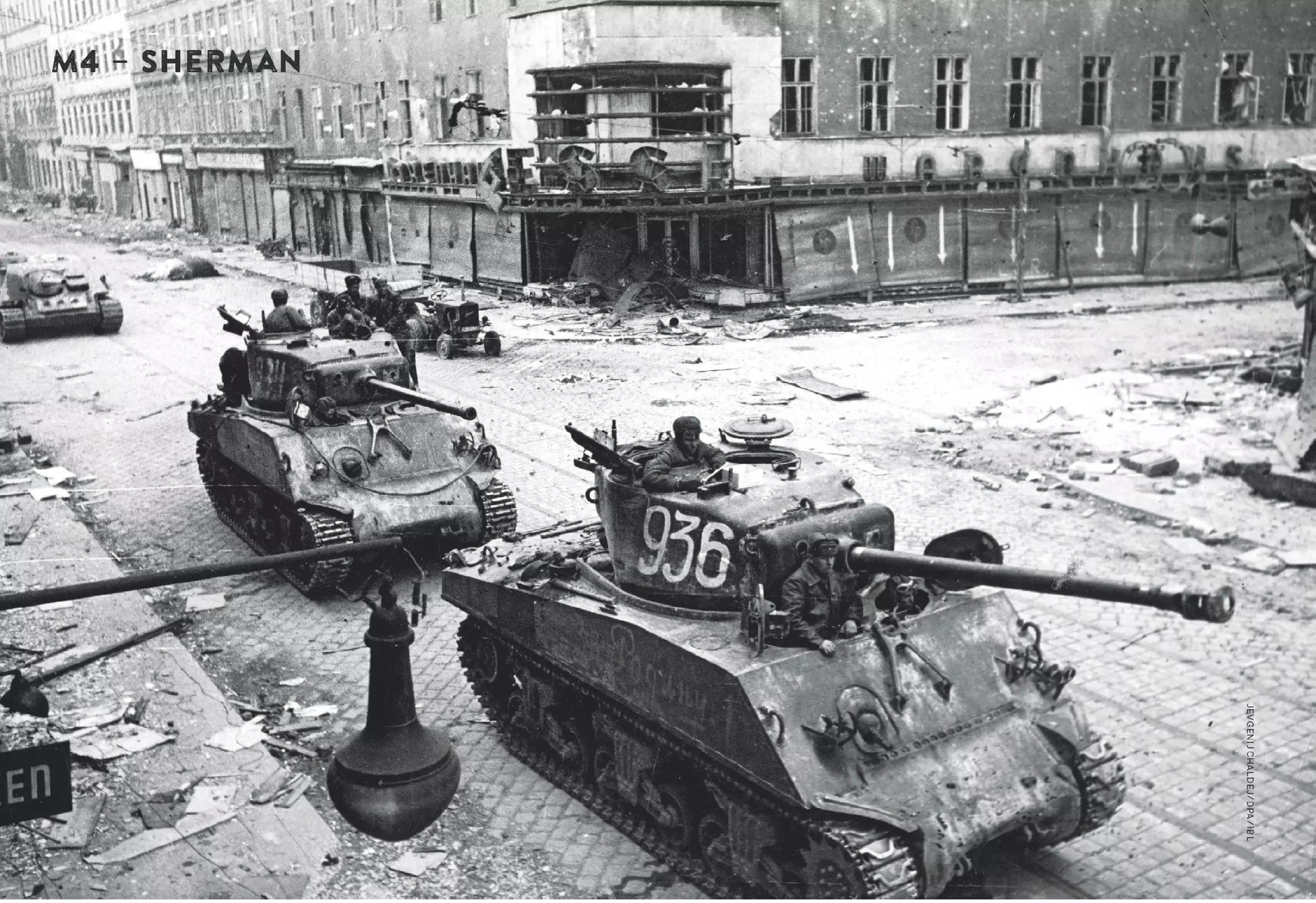
View through the M70F optic scope for the 7.5-mm gun.

There was nothing about the Medium Tank M4 that corresponded to the step-by-step evolution of various *Ausführung* (models) that the Germans used, or the slightly more soluble annual development of Soviet tanks. Several different Sherman models

Other models of Medium Tank M4

M4	M4A1	M4A2	M4A4	M4A6
6,748 manufactured between July 1942 and January 1944. A further 1,641 M4s with 105-mm howitzer were also produced on the same chassis. The model was powered by a 400-hp Wright Continental engine.	First model in production. Hull was cast rather than welded. From January 1944, it was manufactured as the M4A1E4 with heavier armour, 76-mm gun and wet ammunition storage. It had the same engine as the M4, but the E4 had a more powerful 460-hp model. 9,707 were produced in all.	A total of 10,968 were produced until July 1945. Was sent to the US Marines and as a lend lease to both UK and the Soviet Union. The E4 version was produced from June 1944. Powered by 410-hp diesel General Motors engine.	7,499 were produced until the end of 1943. Had longer chassis to accommodate the 425-hp Chrysler Multibank engine. The most common variant in the British army. About 600 (including other models) were upgraded with the British 17-pounder for the Firefly variant.	Replaced the M4A4 in October 1943, but production was discontinued after 75 tanks when it was decided to standardise Ford and Continental engines in February 1944. It had Caterpillar diesel engines.



JEVGENIJ CHALDEJ/DPA/IBL

Two of over 4,000 Sherman tanks delivered to the Soviet army. The tank was dubbed "Emcha". Both tanks in this photo, taken in Berlin in 1945, are M4A2s with 76-mm guns in the new and larger turret.

▶ were simultaneously in production and upgrades were introduced as soon as possible. The various models were a consequence of predicting that engines would be in short supply as production volumes grew.

Initially, it was suggested that the hull's upper part would be precast, but not all manufacturers were able to produce it. As increasing numbers of manufacturers became involved (eventually totalling 11), the welded construction became more common. Models weren't meant to be mixed, which led to a pattern where specific variants (based on engine type) went to individual countries or forces. For example, the diesel-powered M4A2 tank was delivered to the US Navy as well as the Soviet Union and UK. In principle, the M4A3 was only distributed to the US Army, while the M4A4 became the most common type among British forces.

THE TANK'S PROTECTION was developed as it was tested in combat. One of the first improvements was that the minimal gun shield was replaced with one that covered more of the turret's front.

It was soon noticed that M4s often exploded when hit. Or, to be more precise, they went up in flames – an ammunition fire. The end result was the same for those involved – particularly for unfortunate crew members in the original turret with a single hatch. Storage space for ammunition had primarily been found above the belt assembly. This meant it was positioned high on both sides of the hull, making it vulnerable. The problem was corrected by reinforcing the sides with welded armour plates where the ammunition was stored.

THE TURRET WAS also reinforced with external armour plating on the gunner's side. Extra armour was also fitted to the hull front. To reduce the main cause of ammunition fire, extensive construction changes saw the ammunition now stowed in cartridges surrounded by water-filled jackets placed on the floor of the hull – in other words, as low as possible. This became known as 'wet storage'.

The widespread practice of carrying more ammunition than the M4 was designed to hold meant that ammunition fires still broke out in many tanks when they were hit. These official upgrades weren't the only improvements – there were numerous

"THIS ALLOWED OTHER WEAPON SYSTEMS TO COMPENSATE FOR ANY OF THE SHERMAN'S SHORTCOMINGS."

modifications made in the field to boost protection too. Ingenious constructions on the side and front of tanks allowed troops to add sandbags; strapping logs to the sides was another solution.

The strengthening of armour increased a tank's ground pressure, which in turn reduced its performance in terms of horsepower per tonne. Apart from boosting the engines, there was little that could be done to counteract it. Ground pressure could be reduced slightly by mounting 'duckbill' end connectors on the outer edge of the belt, but it wasn't until the introduction of a new belt assembly, HVSS, that there was a marked improvement in both ground pressure and suspension. This saw the belt width widened from 42 to just over 58 centimetres to spread the tank's weight.

An important step in Sherman's development was taken when the new 76-mm gun was introduced in early 1944. The original 75-mm gun was a good compromise; it was superb for shooting explosive shells, the tank's most common task, and it was also capable of firing armour-piercing rounds at tanks until the Panzer VI (Tiger I) made its debut in 1942. In 1943, the Panzer V – named 'Panther' – arrived and the Allies assumed it would replace the ageing Panzer IV. A new gun with better capabilities of penetrating armour was required. The Americans discovered they didn't have space for the gun they'd prefer, but that it would fit into the T23 turret from a project that had been set aside.

The loader gained his own hatch with the new turret. The British went their own way and mounted their own proven 17-pounder (76-mm) gun in the turret. The first delivery of 130 Sherman M4A1 (76) models designed for the US Army arrived in Britain in April 1944. US Army commanders were uninterested in the new tank because the gun wasn't particularly effective with explosive shells. The new gun's shells contained only half as much explosive as the old. General Patton initially refused to deploy the new tank to his units.

HOW GOOD WAS the Sherman? In armoured combat it was vital the opponent was spotted first – then the crew had to either fire and hit first or withdraw to another location if going into battle wasn't the appropriate move.

To improve its ability to tackle its opponent, the tank required a well-trained and experienced crew with good observation and simple operations for quickly aiming the gun at its target and hitting first. Most M4 crews were well-trained, and if they were lacking in any area, it was simply combat experience during the early stages of the tank's appearance in the theatre of war.

Good observation relied on the tank commander being able to work with his head outside the turret. The gunner did enjoy a significantly wider field of view than his German opponents, which gave him better observation allowing him to more quickly aim and fire the gun. The division of labour within the tank was efficient too. Possibly the loader might feel pressure if the radio chirped during battles.

THE ORIGINAL 75-MM gun performed well with explosive shells, which remained the most common form of tank fire throughout the war. The gun, however, fell short when it came to battling other tanks, although there were no major problems before the Panther and Tiger tanks appeared on the battlefield.

The new 76-mm gun improved the situation, but still had shortcomings. When combating tanks, it was only effective from a relatively short distance and performed best when attacking from the sides or even the rear. In 1944-45, however, the war had progressed to the point that tank warfare was simply part of a much larger whole. US forces often had good access to artillery and aircraft support. This allowed other weapon systems to compensate for any of the Sherman's shortcomings.

Its protective armour was a compromise right from the start. It was never strengthened to the point that crews felt safe from being hit by heavier tanks. It was also not impervious to light-armour weapons with shaped charges, such as the Panzerfaust. That said, crews were as proud of their improvised armour from sandbags and spare track links as they were reassured by official upgrades.

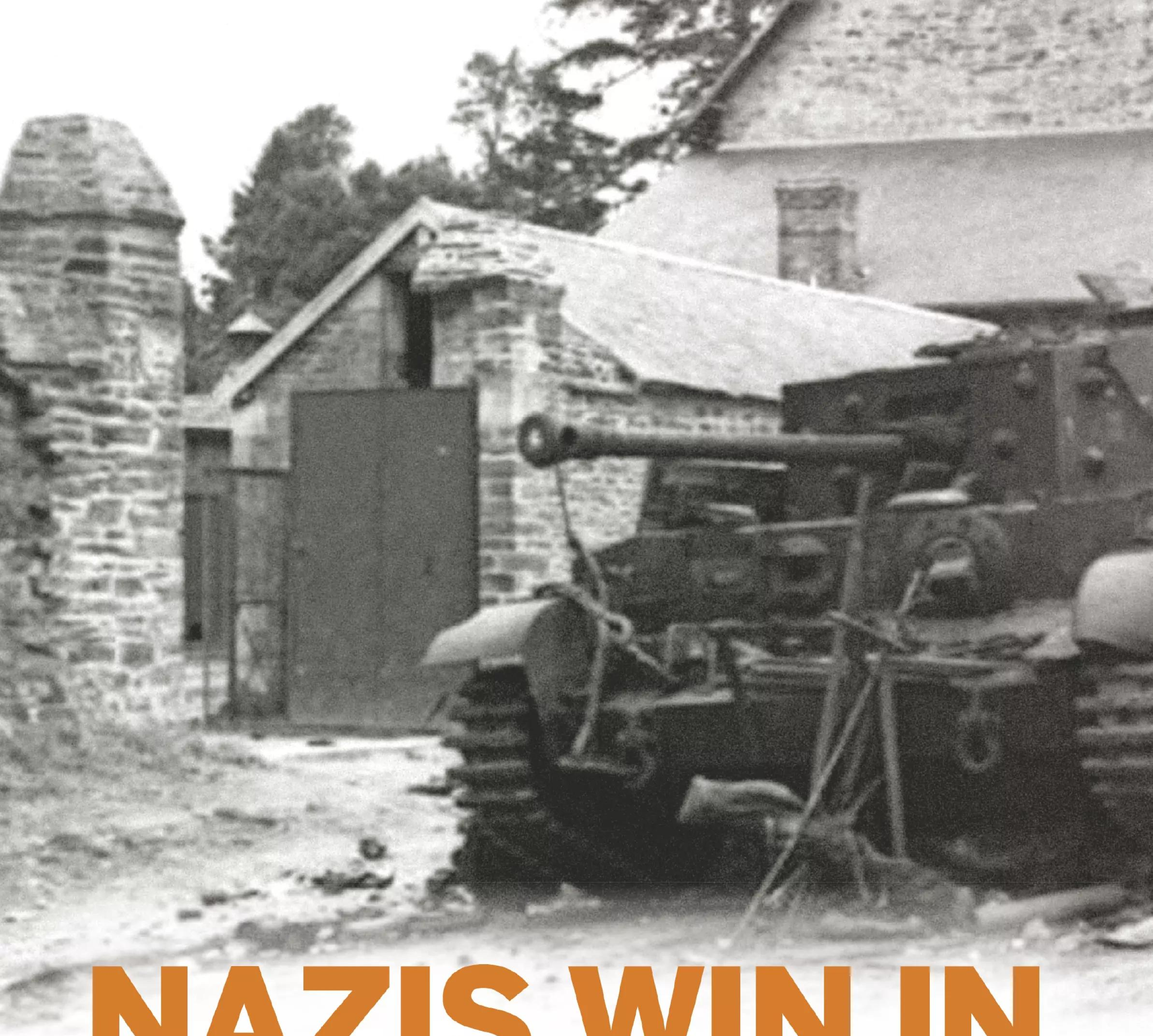
The M4 offered a good compromise between weight and horsepower, but its ground pressure was relatively high until the new HVSS track assembly was deployed in newer models. That said, the M4 could keep relatively high speeds where the terrain wasn't too soft.

One major difference compared to German tanks was reliability. Forces equipped with Shermans could traverse several long stretches of road without encountering mechanical problems. Their availability in the field was often over 90 percent – numbers the unreliable German tanks never came close to matching.

The Sherman tank may not have been the best engineered tank of World War II, but it was still robust, able to work anywhere from the jungle of the Far East and the Soviet steppes to the varied terrain of Western Europe and the desert in North Africa; plus it was easy to produce in large quantities. It fulfilled the basic requirements for firepower, protection and mobility, and at the end of it all was on the war's winning side. ★

Harald Sonesson is a reserve officer with a background in tank mechanics.

Further reading: Tank! 40 Hours of Battle August 1944 (1986) by Ken Tout ★ **Sherman Medium Tank 1942–45** (1993) by Steven J Zaloga and Peter Sarson ★ **Panther vs Sherman – Battle of the Bulge 1944** (2008) by Steven J Zaloga.



NAZIS WIN IN NORMANDY

The Normandy landings in 1944 spelled the beginning of the end of the fighting on the Western Front. But at Villers-Bocage, the Germans managed to demonstrate to the Allies they would fight to the last in World War II's final phase.

Text: **JONAS NILSSON**

The British encountered hard resistance in the small French town of Villers-Bocage one week after the invasion of Normandy. Here's one of the many Cromwell tanks knocked out by the Germans.

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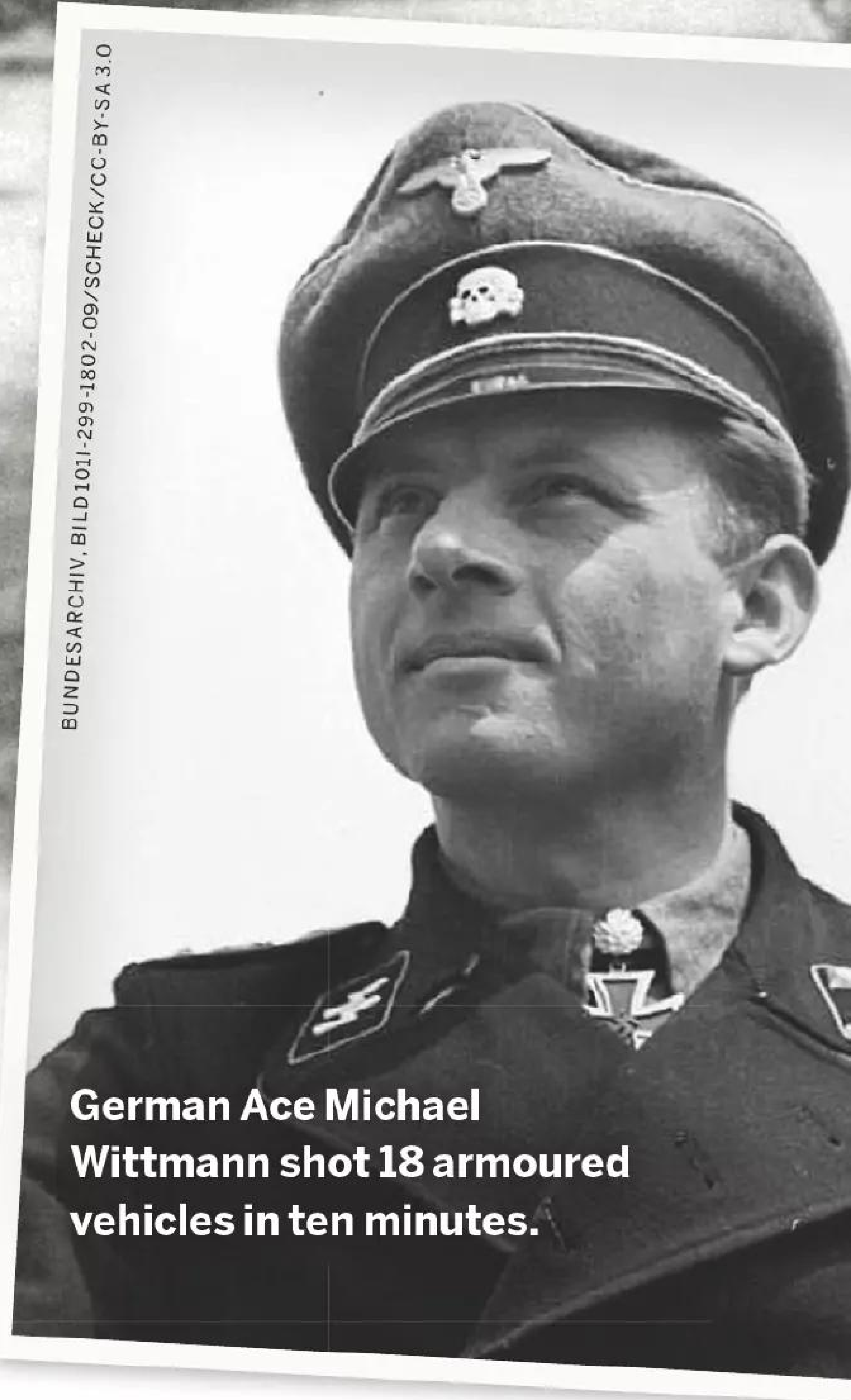

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German Ace Michael Wittmann shot 18 armoured vehicles in ten minutes.

When the British 22nd Armoured Brigade moved into the small town of Villers-Bocage in the north of Normandy on 13th June, 1944, they received an enthusiastic welcome from the locals. The troops were given calvados – a local cider brandy – as well as cheese and butter. Townspeople – particularly young girls – leapt on to the trucks to kiss the soldiers and join the historic convoy. Four years of German occupation appeared to have ended. Apart from a German armoured vehicle – which quickly withdrew – no enemies were seen.

Hill 213, north of the town, was a strategically important position. The brigade's commander – Brigadier William 'Loony' Hide – ordered Lieutenant Colonel Viscount William Cranley, commander of the 4th County of London Yeomanry (CLY) to hurry up and capture the hill. This meant advancing without first reconnoitring the terrain, but Cranley was forced to accede to Hinde's demands, ordering the force's A Company to move forward. Little did they know what was waiting in a copse behind the road.

Five German Panzer VI Tiger I tanks from *SS-Panzerabteilung 101* (101st SS Heavy Panzer Battalion) were hiding off the road, and unnoticed by the passing British troops. Their commander was the legendary panzer ace *SS-Obersturmführer* (Lieutenant) Michael Wittmann, who'd been credited with 120 tank kills on the Eastern Front and had received the Knight's Cross with Oak Leaves. Wittmann had not previously fought on the Western Front but had developed a strong hatred for the British and Americans after seeing how their bombings had reduced German cities to rubble. To his crew he said, "We have only one watchword and that is 'revenge'!"

"LITTLE DID THEY KNOW WHAT WAS WAITING"

AFTER THE NORMANDY landings on 6th June, 1944, the pace of the British advance had slowed. Reasons included fierce German resistance, inferior ▶

tanks in some cases and a terrain whose dykes and hedges favoured the defenders.

The original Allied plans saw the key Normandy city of Caen being captured by 8th June. But the attempt ended in bloody warfare. British commander Field Marshal Bernard Montgomery decided, therefore, to surround the city in a pincer movement. He inserted two of his best divisions: the 51st (Highland) and 7th Armoured (Desert Rats). Both forces had excelled during the fighting in both North Africa and Italy.

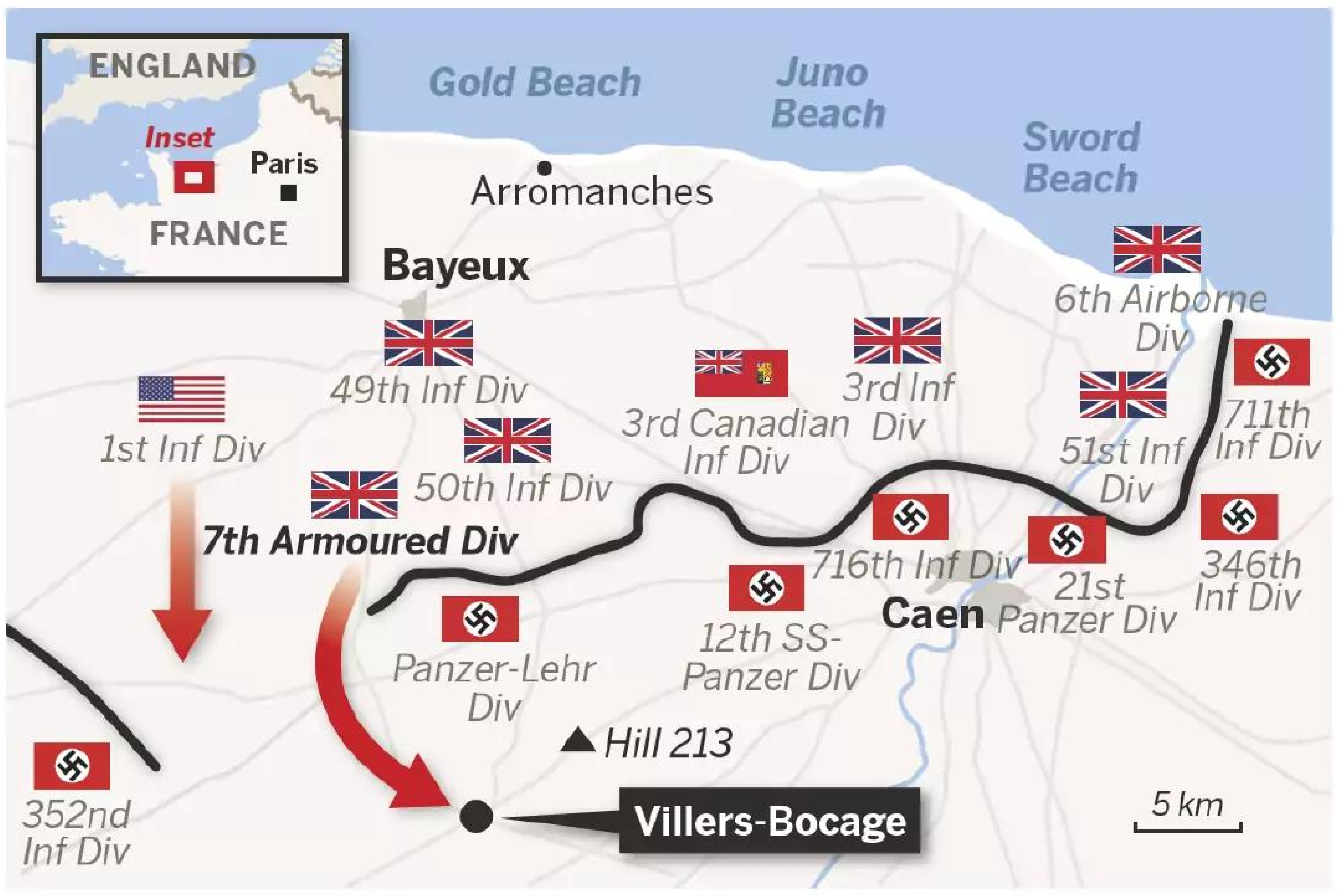
51st Division, which attacked east of the city, soon found itself in trouble. A barrage of artillery and machine-gun fire caused major losses. In some places, the Scots were broken, throwing down their weapons and equipment before fleeing to the rear. Things went better for the 7th Armoured Division, which attacked west of Caen. Through a hole in German lines they moved south-west with the 22nd Armoured Brigade leading the way. Early on 13th June they reached Villers-Bocage. Unaware they were heading into an ambush, the British armoured convoy halted on the road up to Hill 213. Some of the crew even climbed out of their tanks, which numbered 20 Cromwell IVs and four Sherman Fireflies.

WITTMANN SAW HIS opportunity. He drove out of the copse, parallel to the column, and opened fire. The first two shots destroyed a Firefly and a Cromwell. He then proceeded to blast tank after tank until the whole column was reduced to burning wreckage. Those British shells that were fired back either failed to hit their target or penetrate the Tiger's thick armour.

Wittmann then directed his tank towards Villers-Bocage where he discovered the supporting infantry, a company from the 1st Rifle Brigade who travelled in Bren personnel carriers, M5A1 Stuart light tanks and M3 Half-tracks. The vehicles' thin 8-10-milimetre armour afforded little protection against the Tiger's 88-mm shells.

After ramming the first carrier, Wittmann opened fire on the foremost vehicle in the column and then targeted the one at the rear. The cars in the column were now trapped between burning wreckage and couldn't escape. Wittmann blasted the vehicles one by one: a total of eight half-tracks and four Bren-carriers.

From here Wittmann drove into town where he met the 4th CLY's staff company tanks – all Cromwells. Here too, some of the British had dismounted from their vehicles, allowing Wittmann to quickly destroy four of the staff company's tanks as well as two more from the 7th Armoured Division's 5th Royal Horse Artillery. Wittmann had taken less than ten minutes to eliminate 18 armoured vehicles on his own – probably a record.



CHRISTOFFER REHN

The British 7th Armoured Division attacks Caen via a gap in German lines.

In return, the Cromwell crews had learned that even direct hits on Wittmann's Tiger had no impact.

At the same time, the other tanks in Wittmann's company had engaged the 4th CLY's advance force. Three M3 Stuarts were hit in the skirmish. Meanwhile Wittmann had found himself in a duel with a Sherman Firefly and was lucky when his tank was hit without the shell penetrating the front hood. Wittmann now realised he faced a more formidable foe and ordered a retreat. But an anti-tank gun struck the Tiger, disabling it. Wittmann and his crew were forced to flee on foot out of town and back to safety.

AFTER THESE HEAVY losses, the British abandoned their attempt to occupy Hill 213. They remained in Villers-Bocage, however and took up a defensive stance. They deployed clearance squads and evacuated wounded soldiers. During the day, the Germans gained reinforcements from the 2nd Panzer Division.

The Germans counterattacked in the afternoon with the 2nd Panzer Division joining the 101st SS Heavy Panzer Battalion, equipped with Tiger Tanks, a *Panzergrenadier* Company and some Panzer IVs from the Panzer-Lehr Division. The element of surprise had gone, however – the attacks were expected and the British opened fire with anti-tank guns and the powerful 17-pounder guns of the Sherman Fireflies from prepared positions. The Germans were forced to temporarily withdraw after five Tiger Is and two Panzer IVs had been knocked out.

To prevent the Germans from being able to repair their damaged tanks, the British set fire to them, including Wittmann's Tiger. 7th Armoured Division commander Major-General George Erskine now realised that the 22nd Armoured Brigade was being surrounded by renewed German attacks. He ordered a retreat to the starting position at Tracy-Bocage.

The Germans now attempted to take the retreating forces from their side leading to confused

George Erskie commanded the 7th Armoured Division.

"EVEN DIRECT HITS... HAD NO IMPACT"

battles in several places. It took a powerful British artillery barrage to secure the withdrawal. It has been reported that Brigadier Hinde almost lost control of the situation and perhaps should have collapsed. The 4th CLY's commander, Lord Cranley, was captured when his armoured vehicle was knocked out by a grenade. The Germans had retaken Villers-Bocage.

During the night of the 13-14th June, the RAF conducted a large-scale bombing raid that almost levelled the entire town. A further Tiger was destroyed in this attack. The residents who'd greeted the British with such joy were now dead, wounded or homeless.

THE BRITISH ATTEMPT to break through in Normandy had failed completely. But eventually, air sovereignty and numerical superiority proved to be decisive. Caen was finally taken on 9th July after some extremely fierce battles. In August, most of the German forces in Normandy were surrounded in a pocket at Falaise where they were forced to surrender. The Allies could now start their march to the Rhine.

For his efforts at Villers-Bocage, Wittmann was promoted to *SS-Hauptsturmführer* (captain) and assigned a sword to accompany his Knight's Cross with Leaves. On 8th August, he led a group of seven Tiger Is near Cintheaux where he was ambushed by forces including the 1st Northamptonshire Yeomanry. A shell from a Firefly hit the Tiger's armour and ignited its ammunition. In the explosion the tower was blown off, and Wittmann and his crew were killed instantly. It was an end that perhaps matched what Wittmann had subjected to his enemies at Villers-Bocage. ★

Jonas Nilsson is a military history writer.

A Tiger I tank in Villers-Bocage.

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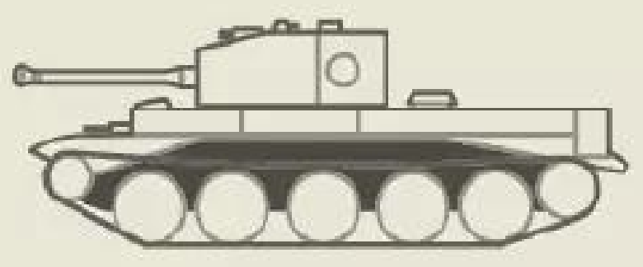
British tanks were crushed by Tigers

★ The British 4th County of London Yeomanry regiment was largely equipped with the lightly armoured but fast and agile Cromwell IV. The force also included some Sherman Firefly tanks, an American model equipped with a powerful British 17-pounder (76-mm) gun. For reconnaissance, they used the US M3 Stuart light tank.

The Cromwell and Stuart tanks were less popular with crews due to their relative lack of armaments and armour protection.

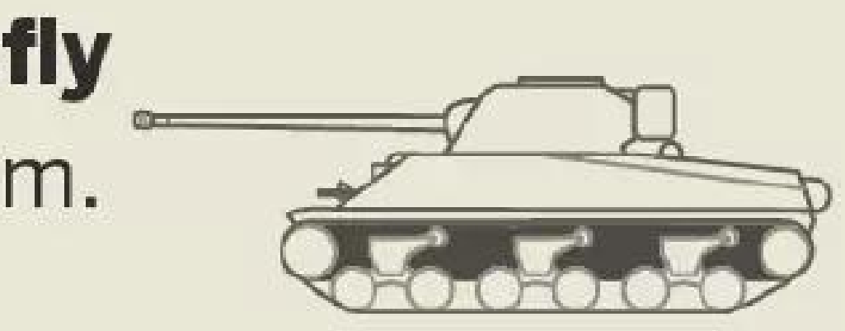
All the tanks used by the British at Villers-Bocage were inferior to the German Tiger I.

Cromwell IV



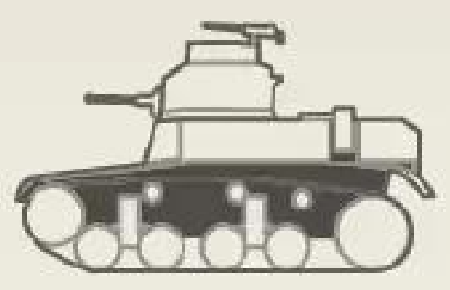
Armour: 8-76 mm.
Gun: 75 mm. Penetrates 68-mm armour at 450 m.

Sherman Firefly



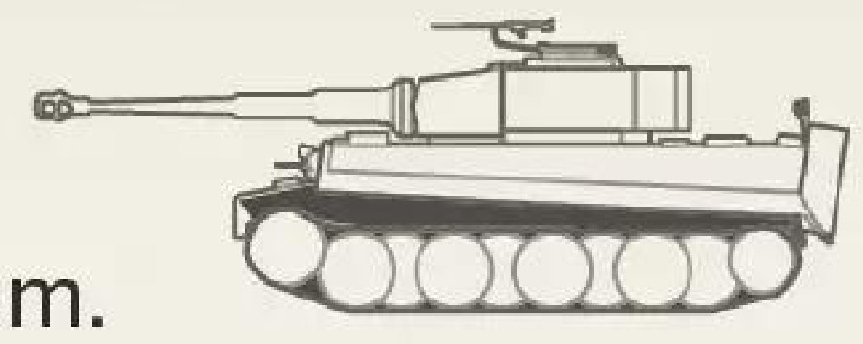
Armour: 12-89 mm.
Gun: 76 mm. Penetrates 137-mm armour at 500 m.

M3 Stuart



Armour: 13-51 mm.
Gun: 37 mm. Penetrates 50-mm armour at 450 m.

Tiger I



Armour: 25-120 mm.
Gun: 88 mm. Penetrates 151-mm armour at 500m.

Remnants of the British column of Bren carriers and half-tracks shot to pieces by Wittmann's tank. A six-pound (57-mm) gun is in the foreground.

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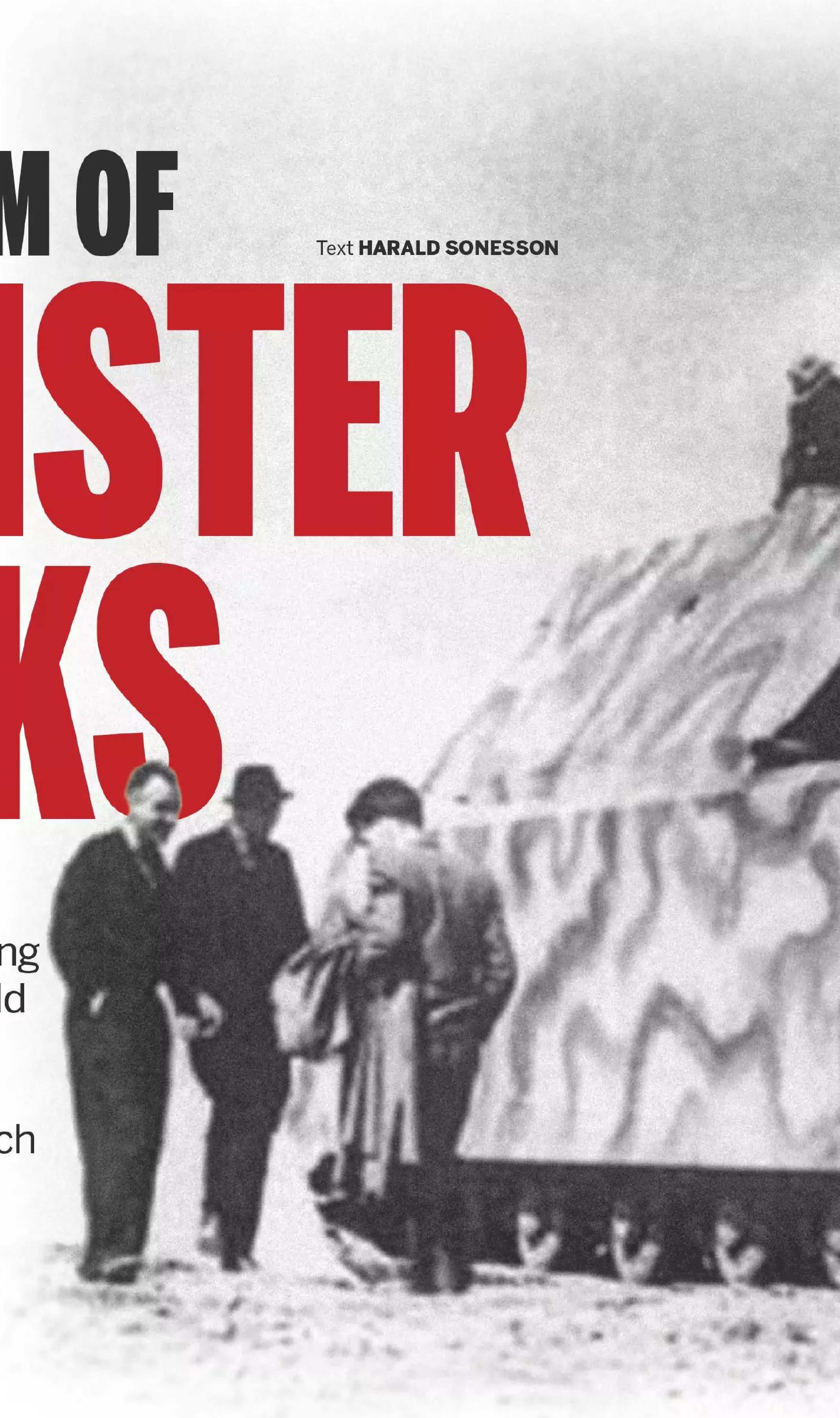
THE DREAM OF MONSTER TANKS

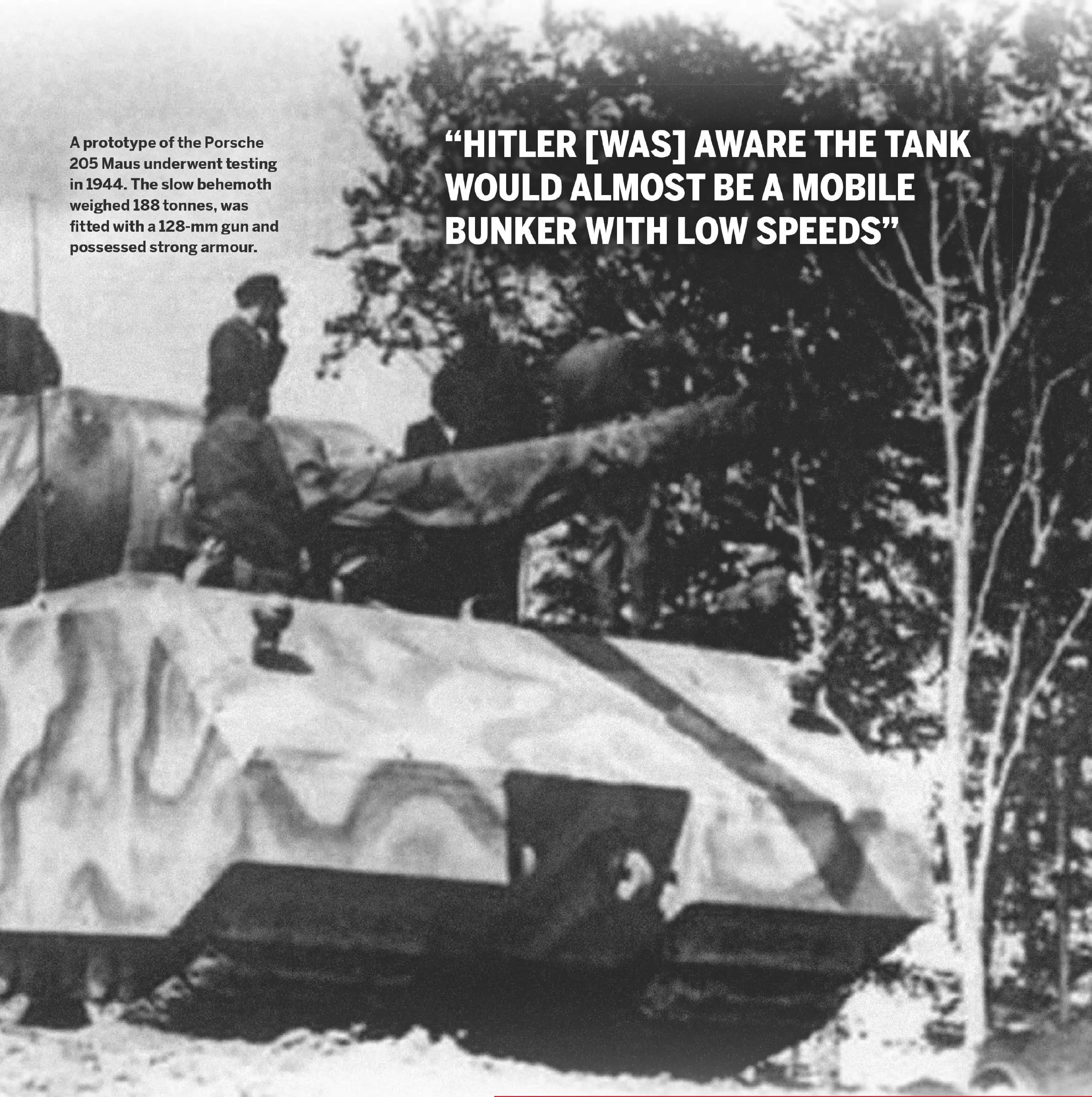
Text **HARALD SONESSON**



World War II featured a recurring dream involving a **super tank** that could break through enemy lines unscathed. These rolling bunkers had much in common: they were expensive, resource-intensive and rarely left the drawing board.

In the spring of 1915, British major T G Hetherington, who was responsible for the production and field tests of armoured vehicles, proposed a new type of war machine. "This machine maybe described as a veritable Juggernaut, heavily armoured, highly offensive and capable of moving across country", wrote John Fuller in 1920. "It consisted of a platform mounted on three wheels... It was to be equipped with three turrets each containing 4-inch guns." This giant machine, Hetherington believed, would move freely behind enemy lines, destroy trenches and artillery forces and wreck railway lines. The proposal was developed and existed in several versions – including one with a single 12-pounder gun. A full-scale wooden model was even constructed, but then development halted.

THE DREAM THAT Hetherington voiced – an almost invulnerable machine that could travel anywhere and

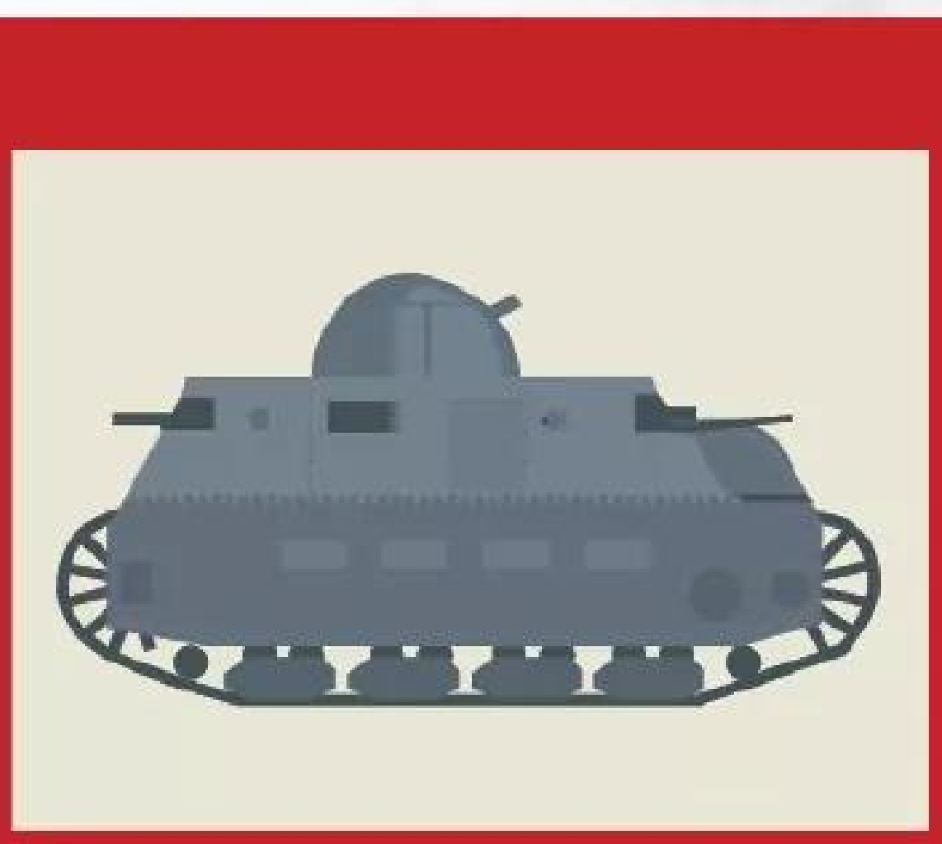


A prototype of the Porsche 205 Maus underwent testing in 1944. The slow behemoth weighed 188 tonnes, was fitted with a 128-mm gun and possessed strong armour.

> **"HITLER [WAS] AWARE THE TANK WOULD ALMOST BE A MOBILE BUNKER WITH LOW SPEEDS"**

spread fear among the enemy – defined the ultimate 'breakthrough tank'. It can be viewed as a very heavy tank tasked with helping infantry break through well-secured enemy lines to defeat their opponent.

THESE BREAKTHROUGH TANKS made their first appearance during World War I. For the period, the 28-tonne British tanks, 23-tonne French Saint Chamond and the German A7V (30 tonnes) were considered very heavy tanks. They were on the limit ►

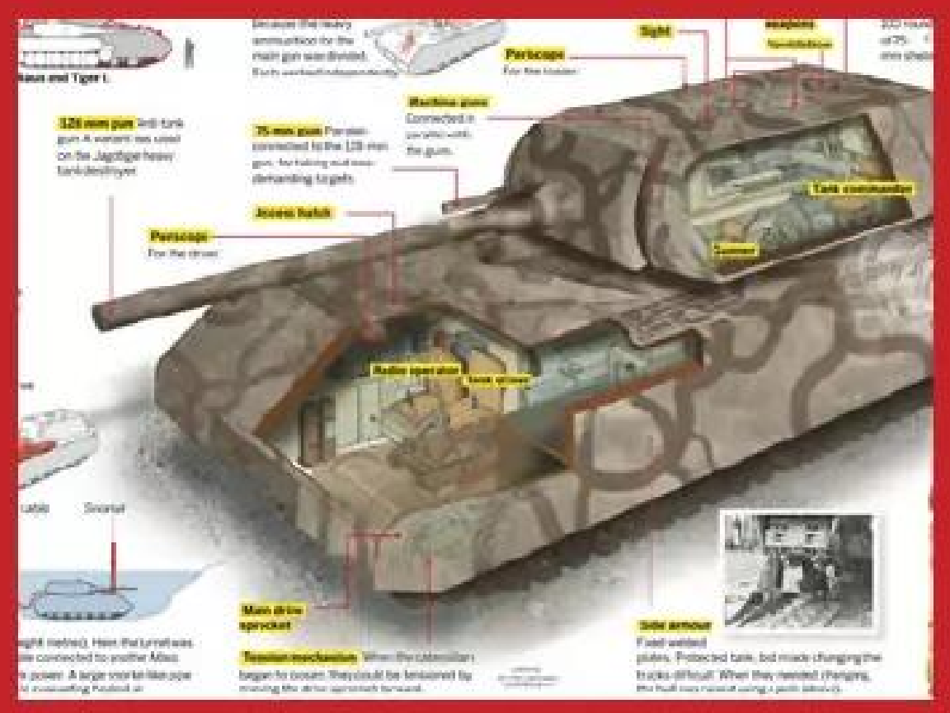


Timeline of giant tanks

★ Development, p168

Cleared the way

★ Definitions, p169



Maus: under the hood

★ Annotation, p172

of what was possible when combining armament, armoured protection, navigability and mobility. Priority was given to the first three areas, because a tank's speed had no need to exceed that of the infantry. Other lighter tanks with higher speed, but poorer guns and armour, were also developed.

THERE WERE EVEN heavier tanks as prototypes or on the drawing board. Several projects were cancelled for various reasons during the war, while others only got so far into their development before the guns fell silent in November 1918.

The French had been working on their Char FCM 2C of almost 70 tonnes, the British had their Flying Elephant weighing just over 90 tonnes while Germany's K-Wagen weighed in at an astonishing 135 tonnes. By comparison, a modern Leopard tank weighs just over 60 tonnes.

During the interwar period, ideas of how tanks and armoured forces should act began to diverge in different directions (see box on the right). Above all others, a British super heavy tank from 1926, the Vickers A1E1 Independent, proved to be the inspiration for several countries' development of heavier tanks, even though only one prototype was produced. It weighed 34 tonnes and had an eight-man crew. The main armament was a 47-mm gun in the turret, but it also had four smaller turrets with machine guns. The A1E1 was to all intents and purposes a rolling bunker or smaller land-based warship.

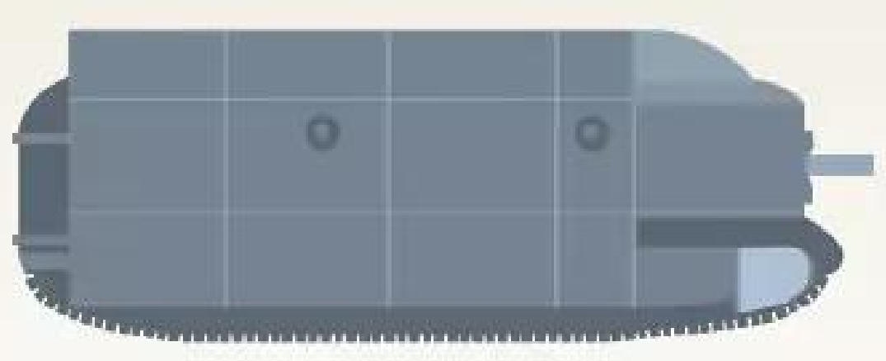
THE LIMIT OF a tank's size and weight was – then as now – primarily set by the roads, railways and bridges. Wide vehicles would struggle getting through older urban districts, tunnels and other cramped places. In the case of rail transport, the standard overall width was 3.15 metres combined with a maximum height of 4.28 metres. The load capacity of the transport network set limits on the combat vehicle's weight. Since most lines of

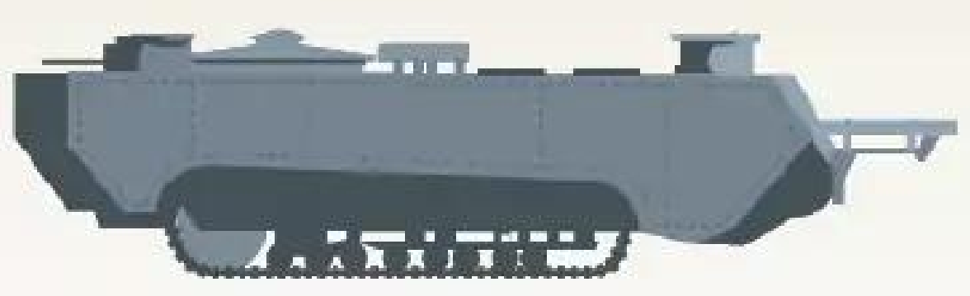
Ahead of their time, German A7V heavy tanks advance on Allied trenches on the Western Front in 1918.

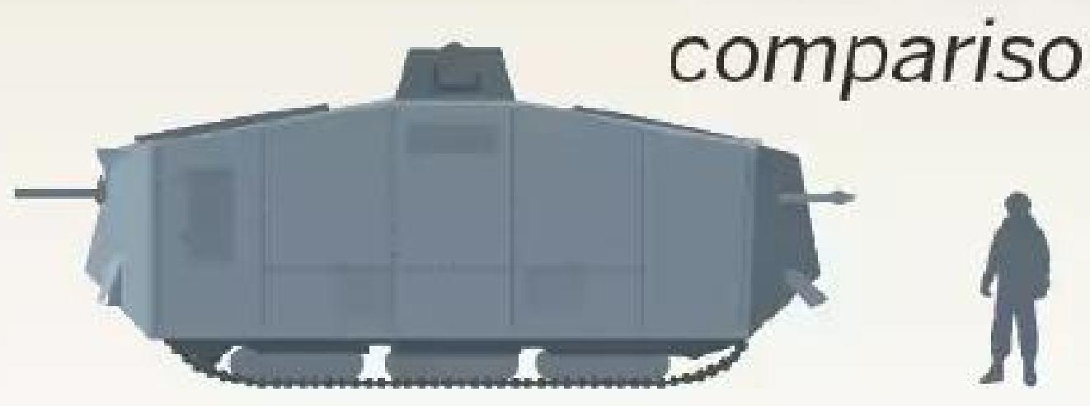
MARY EVANS/IBL

Timeline of giant tanks

★ **Here are the key steps in the development of breakthrough tanks. The vehicles are drawn to the same scale, so their sizes can be compared.**


Flying Elephant
Launched: 1916. **Weight:** 91 t.
Armament: 1x main gun, 6x machine guns. **Numbers:** the project was cancelled in the autumn.
Active: n/a.


Saint-Chamond
Launched: 1917. **Weight:** 24 t.
Armament: 1x 75-mm gun, 4x machine guns.
Numbers: 400 in two variants.
Active: 1917–1918.

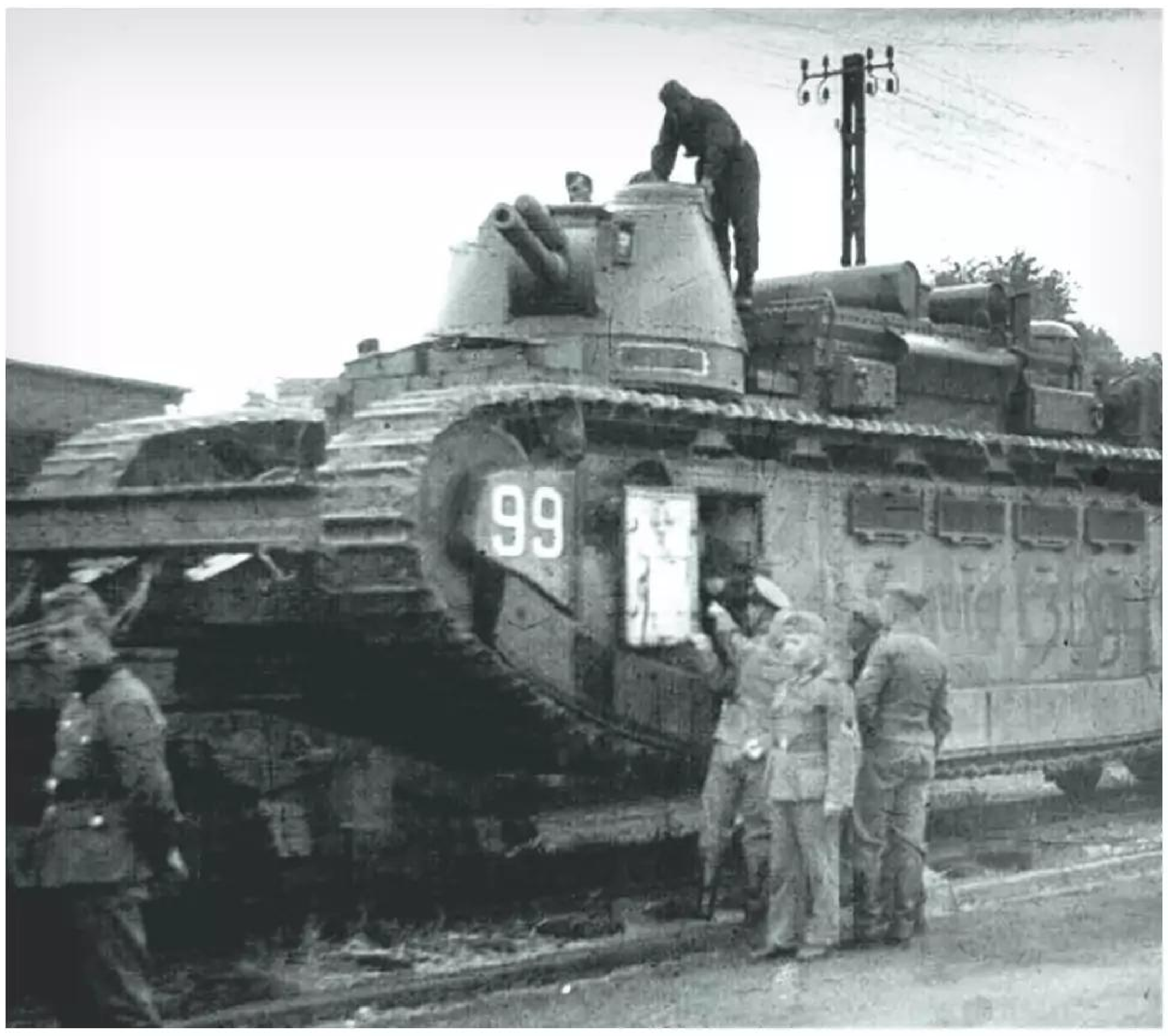

Soldier for comparison.
A7V
Launched: 1917. **Weight:** 30 t.
Armament: 1x 57-mm gun, 6x machine guns.
Numbers: 20.
Active: Western Front, 1918.

> **“FOR THE PERIOD... THE A7V WAS CONSIDERED A VERY HEAVY TANK”**

communication were built for civilian purposes, the dramatic increase in size and weight of tanks were already creating problems before World War II.

One solution was to make it possible to partially dismantle parts for rail transport – for example, the Panzer VI ‘Tiger’ was equipped for travel by switching to narrower *Verladeketten* (transport tracks) while removing the outermost wheels.

The French solution for transporting the 4.1-metre-high FCM 2C by rail was to dismount the forward cupola using specialised rail transport ▶



The 69-tonne Char FCM 2C was a French attempt to build a breakthrough tank. Number 99 was captured by the Germans when it was loaded on to railway cars in 1940.

Tanks cleared the way for infantry

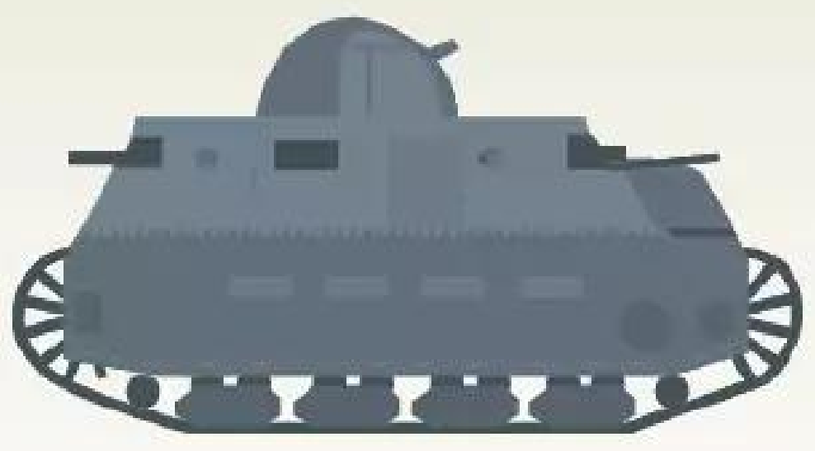
★ There is no fixed dictionary definition for the term ‘breakthrough tank’.

In the article, we’ve defined it as an extremely well-protected and heavily armed tank with low top speed. Its most important job was to target enemy fortifications, enabling other forces to advance through enemy lines.

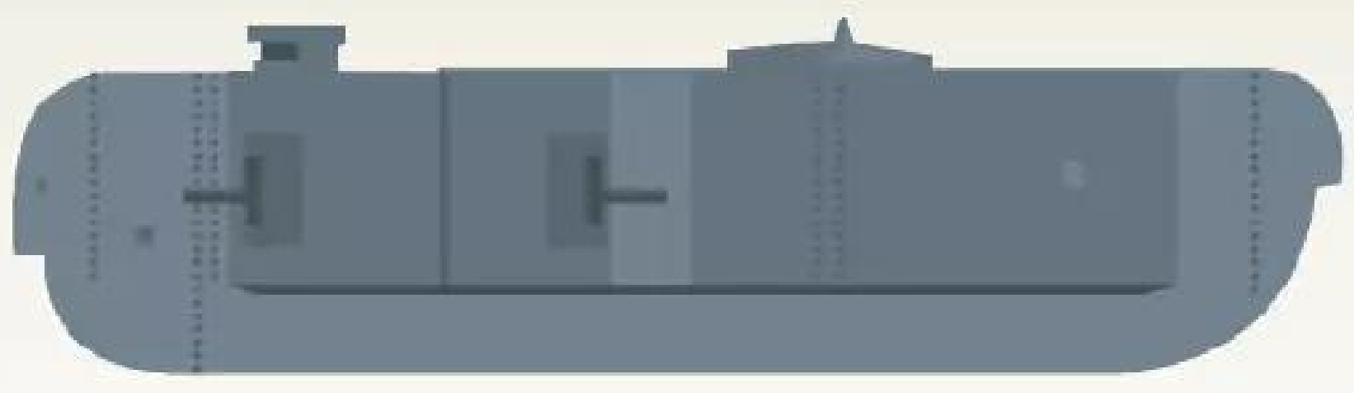
The term ‘super-heavy tank’ also lacks a definitive definition. What mainly differentiates it from a breakthrough tank is that super-heavy tanks were largely tasked with fighting other tanks rather than clearing the way for infantry.

The scale of what constitutes ‘super heavy’ has changed over the years as the armour protection on tanks has become both stronger and thus heavier.

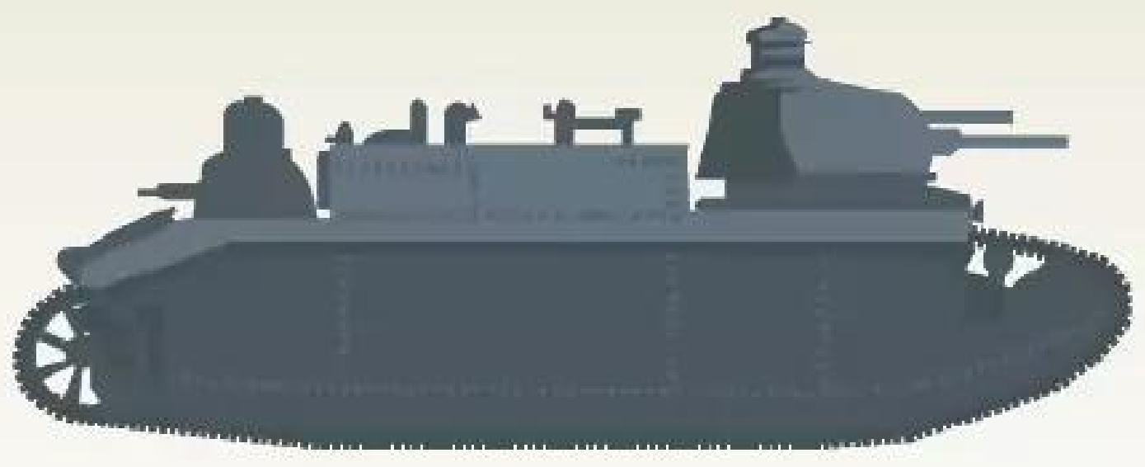
PETTER LÖNEGÅRD/LÖNEGÅRD & CO



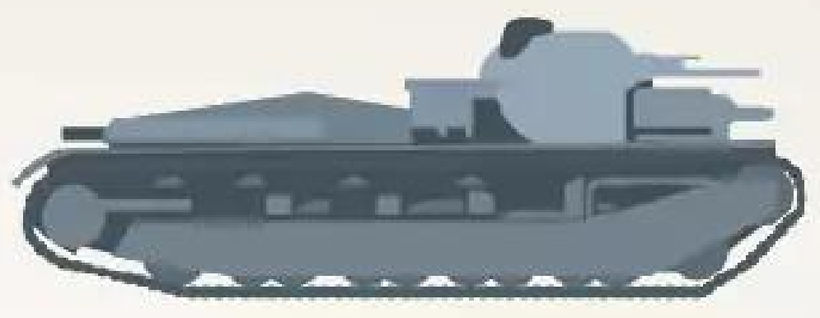
Fiat 2000
Launched: 1918. **Weight:** 40 t.
Armament: 1x 65-mm gun, 6x machine guns.
Numbers: 2 prototypes.
Active: n/a.



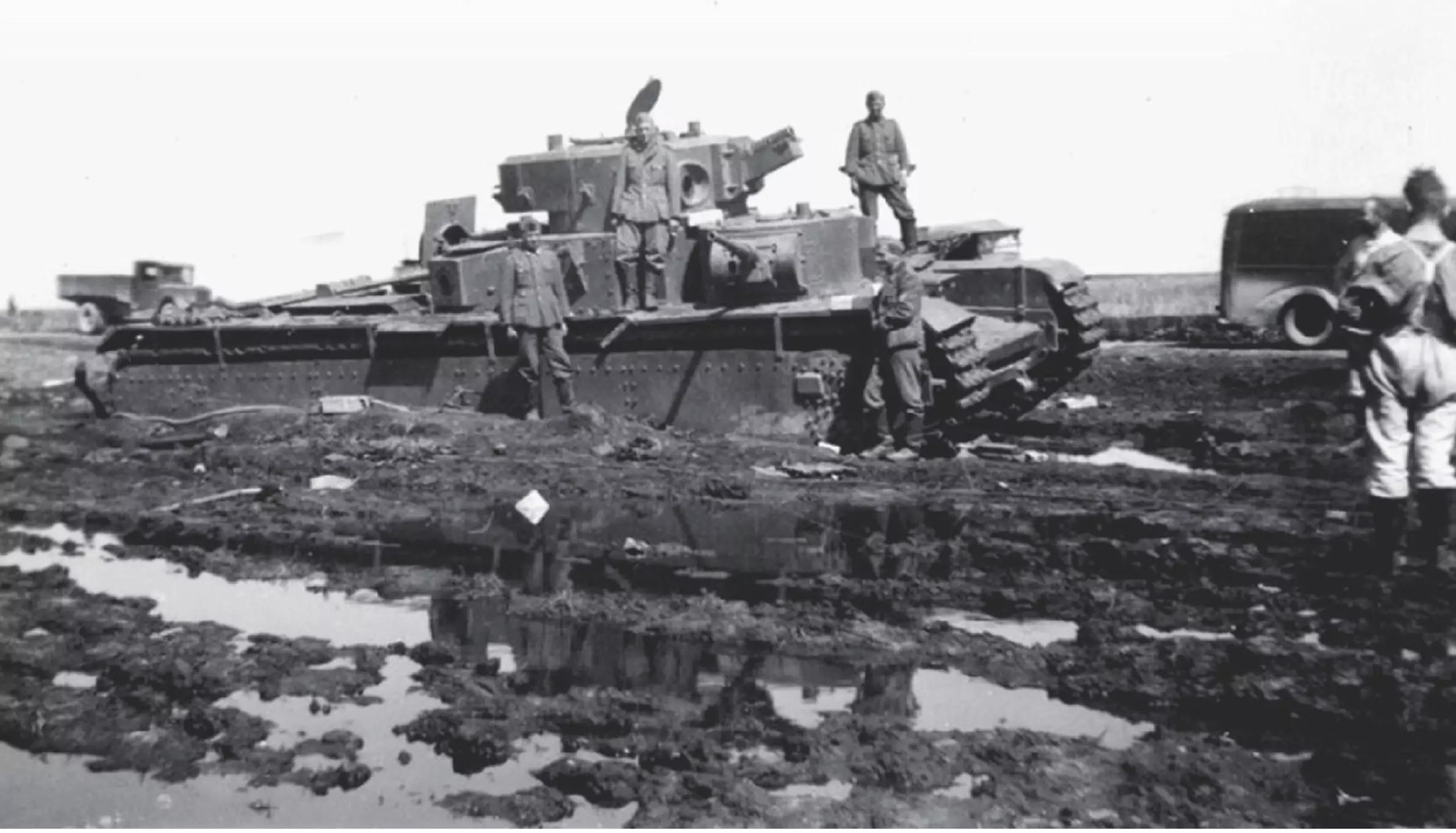
K-Wagen
Launched: 1919. **Weight:** 135 t.
Armament: 4x 77-mm guns, 6-7x machine guns.
Numbers: 2 prototypes.
Active: n/a.



Char FCM 2C
Launched: 1921. **Weight:** 69 t.
Armament: 1x 75-mm gun, 4x machine guns.
Numbers: 10. **Active:** in service 1940, never saw combat.



Vickers A1E1 Independent
Launched: 1926. **Weight:** 34 t.
Armament: 1x 47-mm gun, 4x machine guns.
Numbers: 1 prototype, 5 turrets.
Active: n/a.



The Soviet T-35 was the only tank with five turrets that went into production. Here, German soldiers pose on the tank after it was abandoned by its crew.

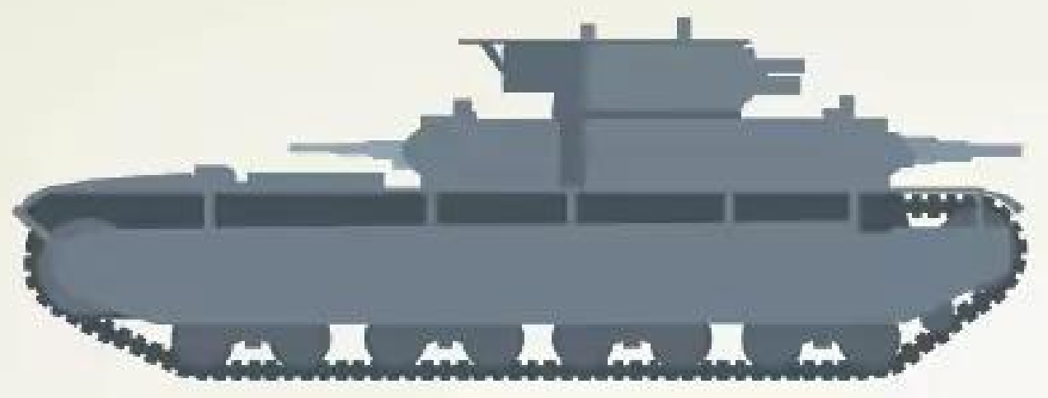
▸ bogies connected in front of and behind the tank. Little could be done about its weight, however, despite marginal adaptations.

WHEN WORLD WAR II broke out, France and the Soviet Union were the only countries using super-heavy tanks weighing over 50 tonnes.

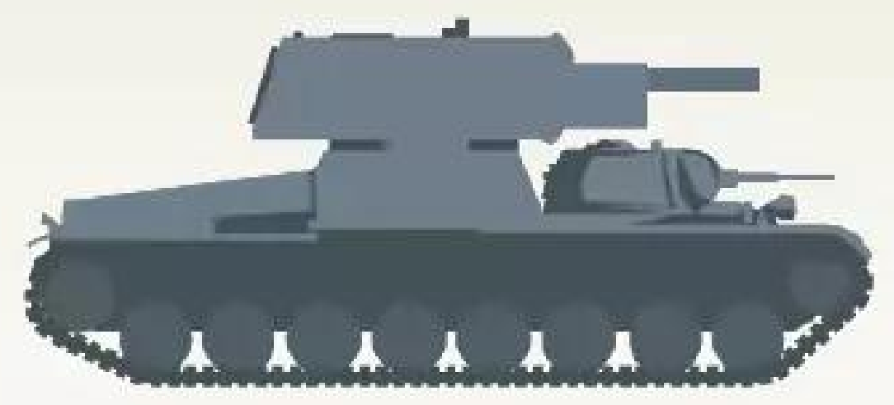
The French Char FCM 2C was developed during World War I, but only entered service in 1921. The main turret housed a 75-mm gun, while three machines guns were fitted to the front and sides of the hull. Another machine gun was found in the rear turret. 12 people were needed to operate the tank.

In total, ten of 300 tanks had been produced before the armistice in 1918. When war broke out in 1939, eight tanks were ready for service. The FCM 2C was displayed for propaganda purposes and it was well known the 20-year-old tank had limited combat ability. The tanks never made it to battle; instead they were either captured after being loaded on to railway trucks or blown up when it was unable to evacuate them away from German forces.

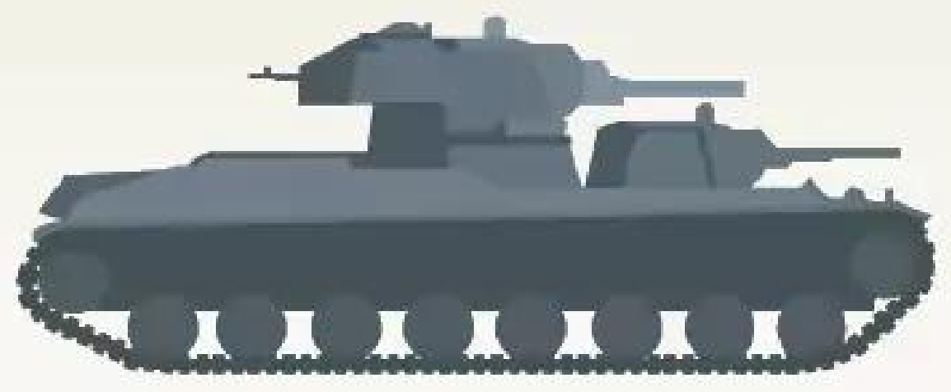
A MODERN REPLACEMENT, the FCM F1 – weighing 139 tonnes – was in development, but never came to fruition. The tank's armaments were 90-mm and 47-mm guns in each of its turrets in addition to six machine guns. It was 10.5 metres long, 3.1 metres wide and 4.2 metres tall. Nine men operated the tank. Its weight and height meant it couldn't be transported by rail without being disassembled into modules. Few bridges



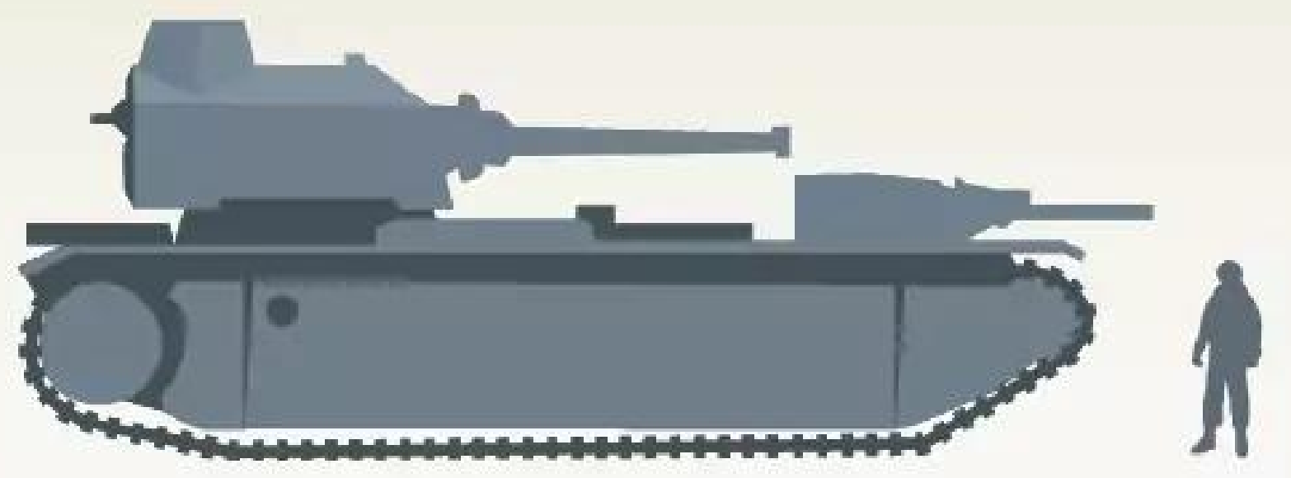
T-35
Launched: 1933. **Weight:** 45 t.
Armament: 1x 76-mm gun, 2x 45-mm 20k guns, 5-6x machine guns.
Numbers: 61, 5 turrets.
Active: German invasion in 1941.



T-100
Launched: 1939. **Weight:** 53 t.
Armament: 1x 76-mm gun, 1x 45-mm gun, 4x machine guns.
Numbers: 2 prototypes, 2 turrets. **Active:** Finland, 1939.



SMK
Launched: 1939. **Weight:** 50 t.
Armament: 1x 76-mm gun, 1x 45-mm gun, 3x machine guns.
Numbers: 1 prototype, 2 turrets.
Active: Finland in 1939.



Char FCM F1
Launched: 1940. **Weight:** 139 t.
Armament: 1x 90-mm gun, 1x 47-mm gun, 6x machine guns.
Numbers: no prototype begun before 1940 surrender.

“THE TANK WITH ITS LARGE CREW AND VARIOUS WEAPONS PROVED DIFFICULT”

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Increasingly heavy tanks required wider tracks, as shown by the Tiger’s many overlapping wheels. Photo of worker welding from the Henschel factory in 1944.

could support more than 35 tonnes, which was probably why it was also designed to operate underwater. 12 tanks were ordered in April 1940, just before the German invasion that ended French arms production. The tank’s development had its roots in a decision made in 1928, which became mired in confusion.

Several different projects with partially overlapping demands aimed at developing a new heavy tank were run more or less in parallel. Various companies submitted one or more proposals for each project. Specification requirements kept changing due to the passage of time and changing conditions. For example, German border fortifications that the tank was designed to break through were developed and strengthened. At the outbreak of war in September 1939 it was realised that time was of the essence in getting the project finished. But it was far too late.

THE SECOND HEAVIEST tank in service, the Soviet T-35, appeared in 1933 weighing 50 tonnes. It had five turrets – one for the main 76-mm gun, two more carrying 45-mm guns and a final two with machine guns. It had a crew of 11 and in total 61 tanks were produced.

Unlike the French FCM C2, the T-35 participated in battle. The tank with its large crew and various weapons proved difficult to manoeuvre and it developed mechanical problems. The Soviet armoured forces were in a deep crisis after Stalin’s purges and had several weaknesses, which helped quickly reduce the available number of T-35s to zero. None took part in the Winter War against Finland. Its baptism of fire occurred during the German invasion in June 1941. Of 48 T-35s found in the 8th Mechanized Corps (Kiev Special Military District) on 22nd June after the invasion had just begin, only five tanks were still functioning on the morning of 26th June.

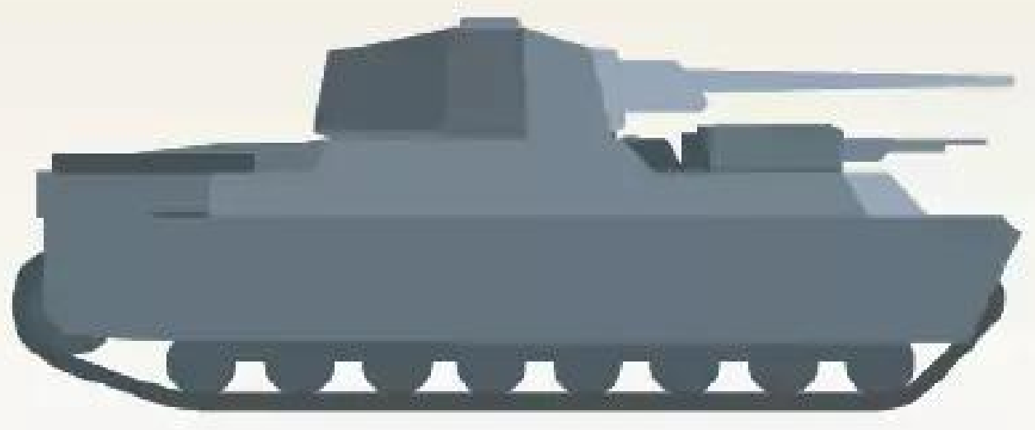
THE SOVIET UNION developed several modern multi-turreted tanks to replace the T-35. Tests were carried out in 1939 with prototypes T-100 (53 tonnes) and SMK (50 tonnes). Both were deployed in the battles against Finland during the early part of the Winter War in 1939, along with the single-turreted KV-1 prototype (45 tonnes).

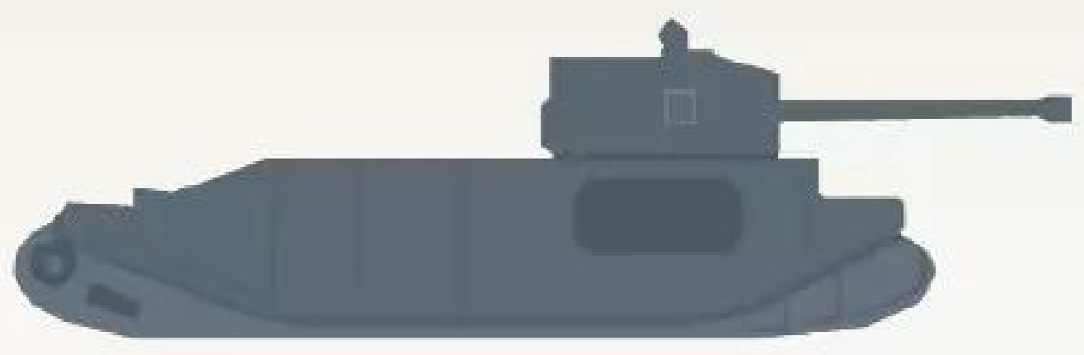
During the Battle of Summa on 19th-22nd December, an armoured force including the prototypes broke through the Finnish lines, but the SMK tank was disabled by a mine and had to be abandoned. In the end, the KV-1 was chosen for production over its multi-turreted rival.

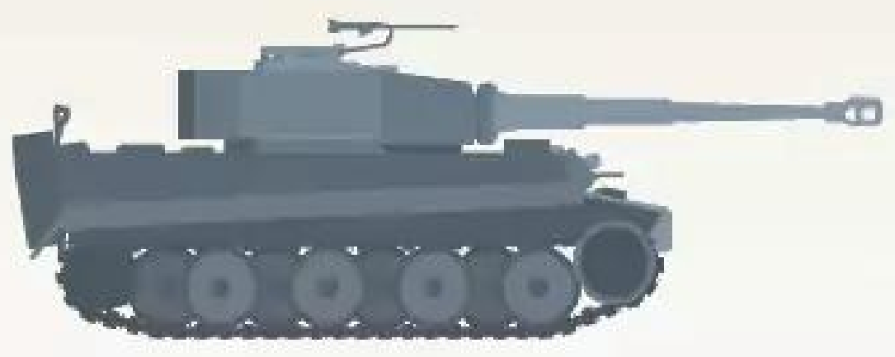
The heaviest German tanks in service at the outbreak of war were the Panzer III and IV. They were conventional tanks with a single turret and weighed

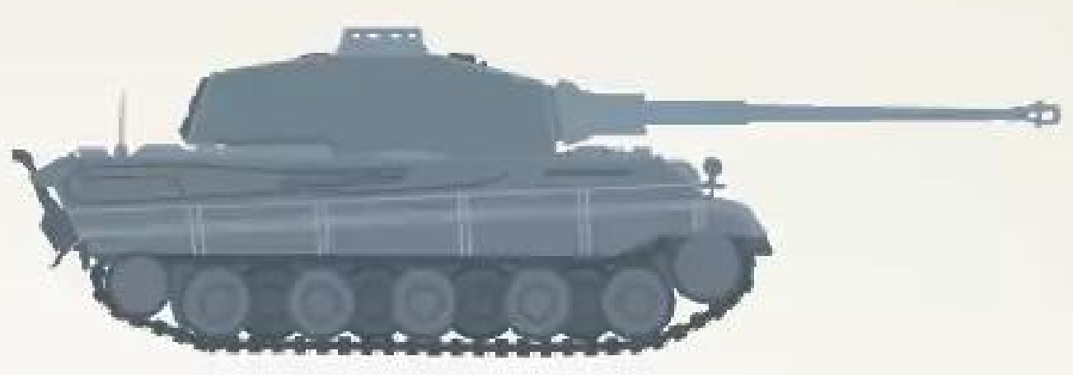
Article continues on page 174 ►

PETTER LÖNEGÅRD/LÖNEGÅRD & CO


O-I
Launched: 1940. **Weight:** 100 t.
Armament: 1x 105-mm gun, 1x 75-mm gun, 1x machine gun.
Numbers: 1 prototype.
Active: n/a.

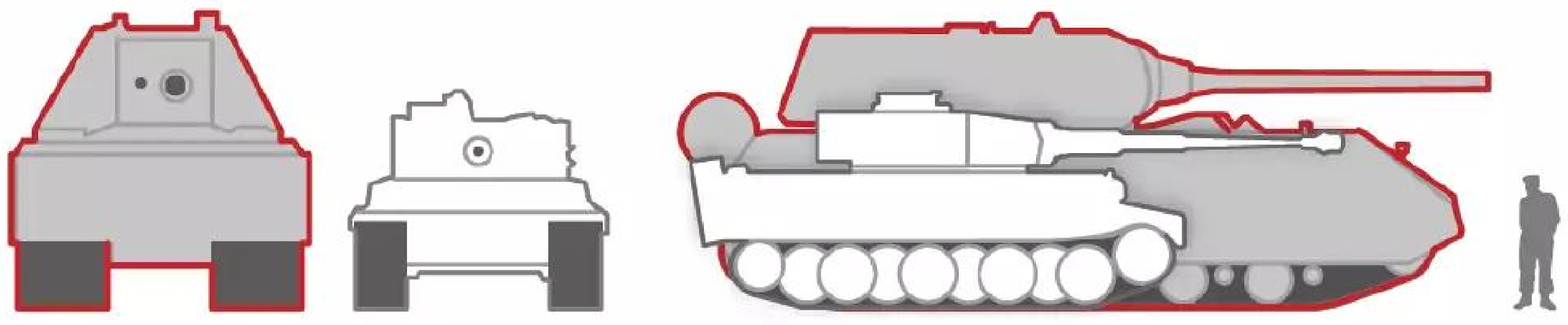

TOG-2
Launched: 1941. **Weight:** 81 t.
Armament: 1x 76-mm gun, 1x machine gun.
Numbers: 1 prototype.
Active: n/a.


Tiger I
Launched: 1942. **Weight:** 57 t.
Armament: 1x 88-mm KwK 36 L/56 gun, 2x machine guns.
Numbers: 1,354.
Active: 1942–45.

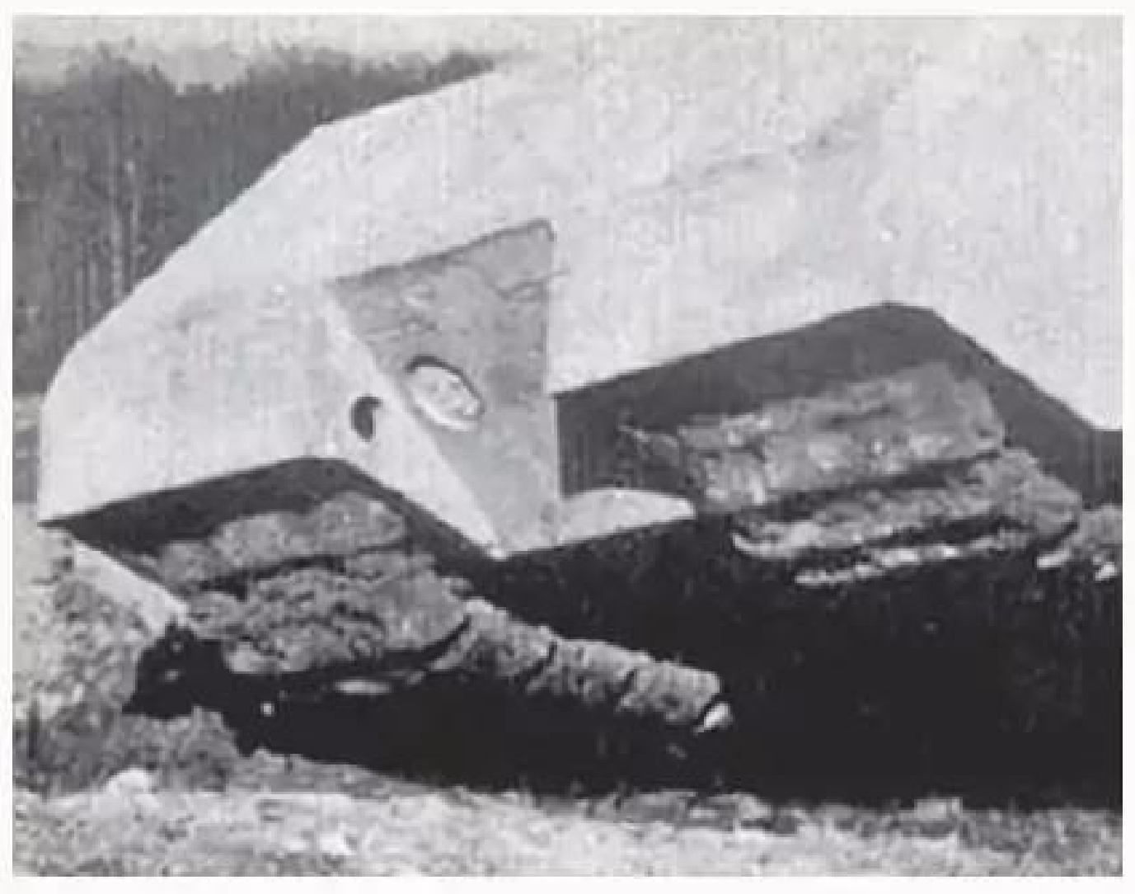

Tiger II
Launched: 1943. **Weight:** 68 t.
Armament: 1x 88-mm KwK 43 L/71 gun, 2x machine guns.
Numbers: 489 with two different turrets. **Active:** 1944–45.

MAUS

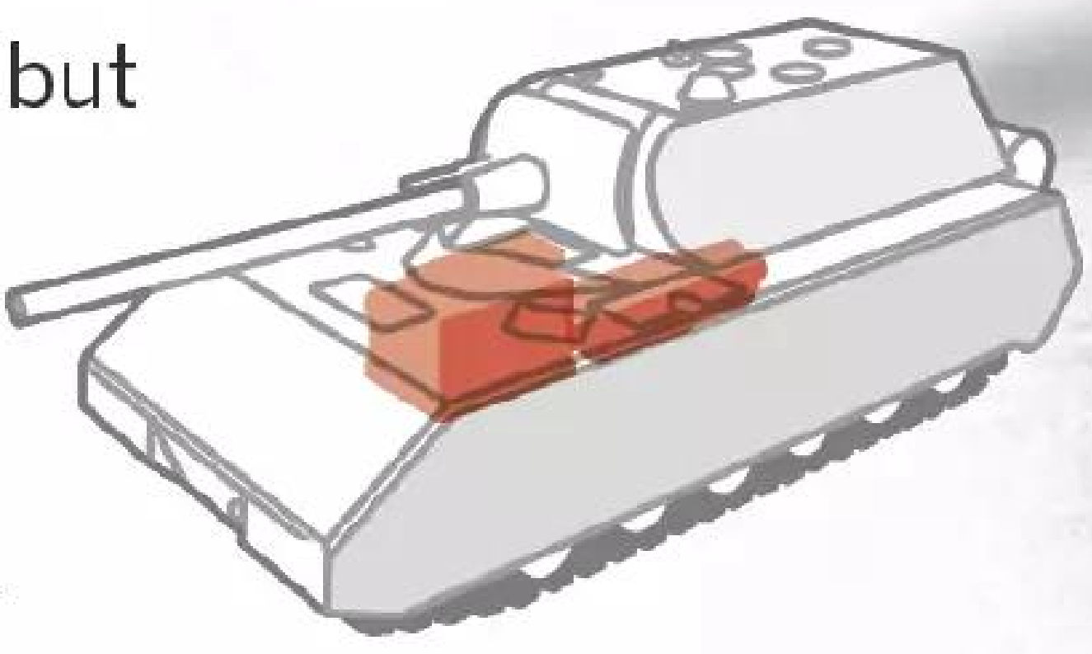
Maus is thought to be one of history's heaviest tanks at 188 tonnes. Porsche designed it, Krupp produced the hull and turret while Alkett was responsible for its final assembly. Two prototypes were made before the project was halted.



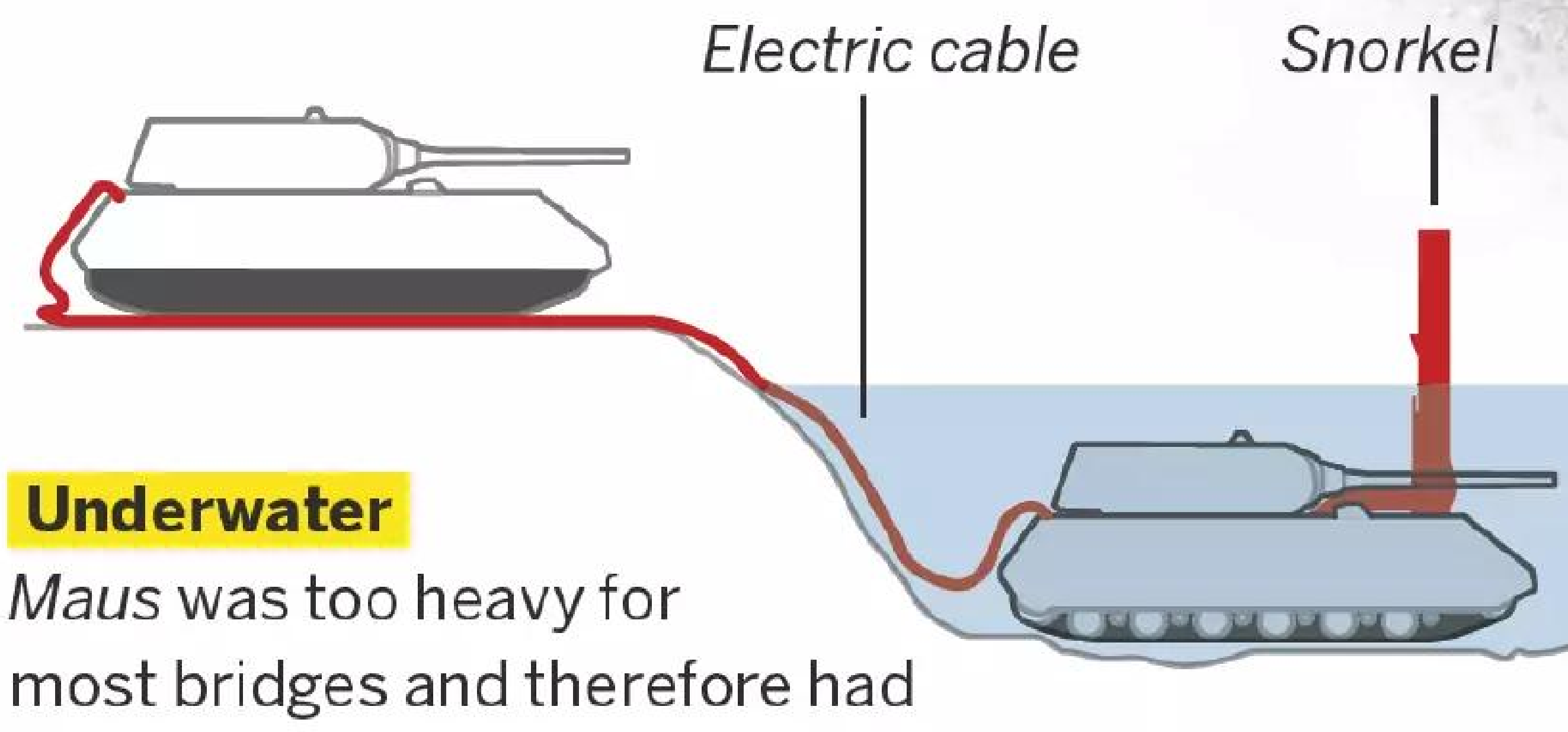
Comparison of size between Maus and Tiger I.



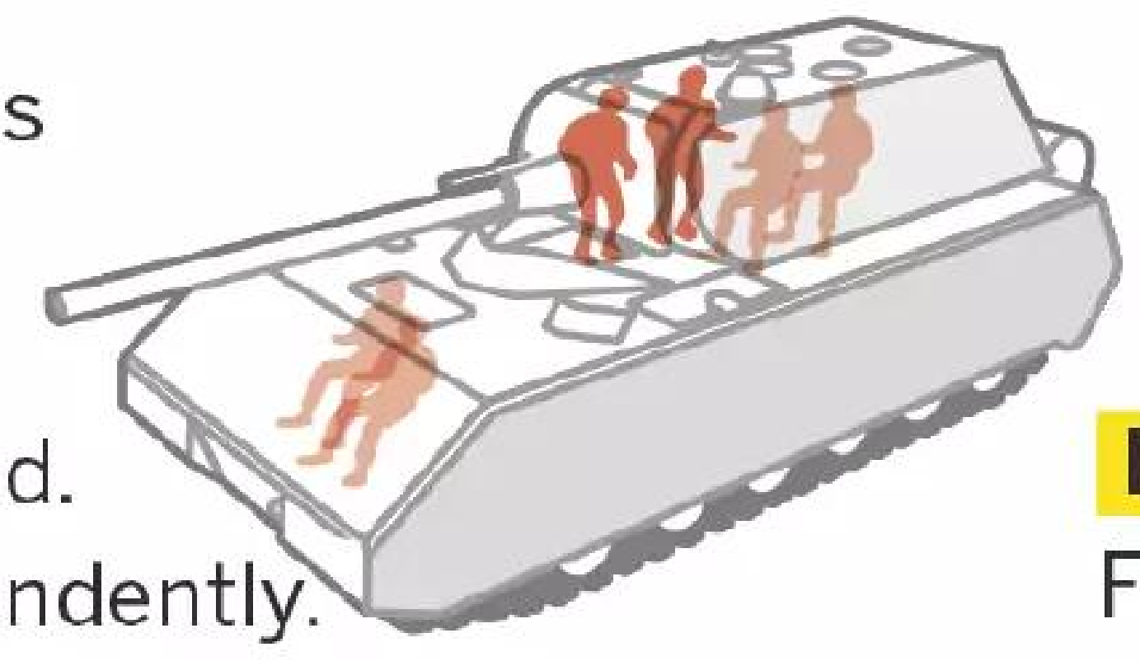
The tracks were 1.1 metres wide, yet still placed heavy pressure on the ground because of the tank's weight: 1.31 kg/cm^2 (Tiger was 0.74 kg/cm^2).



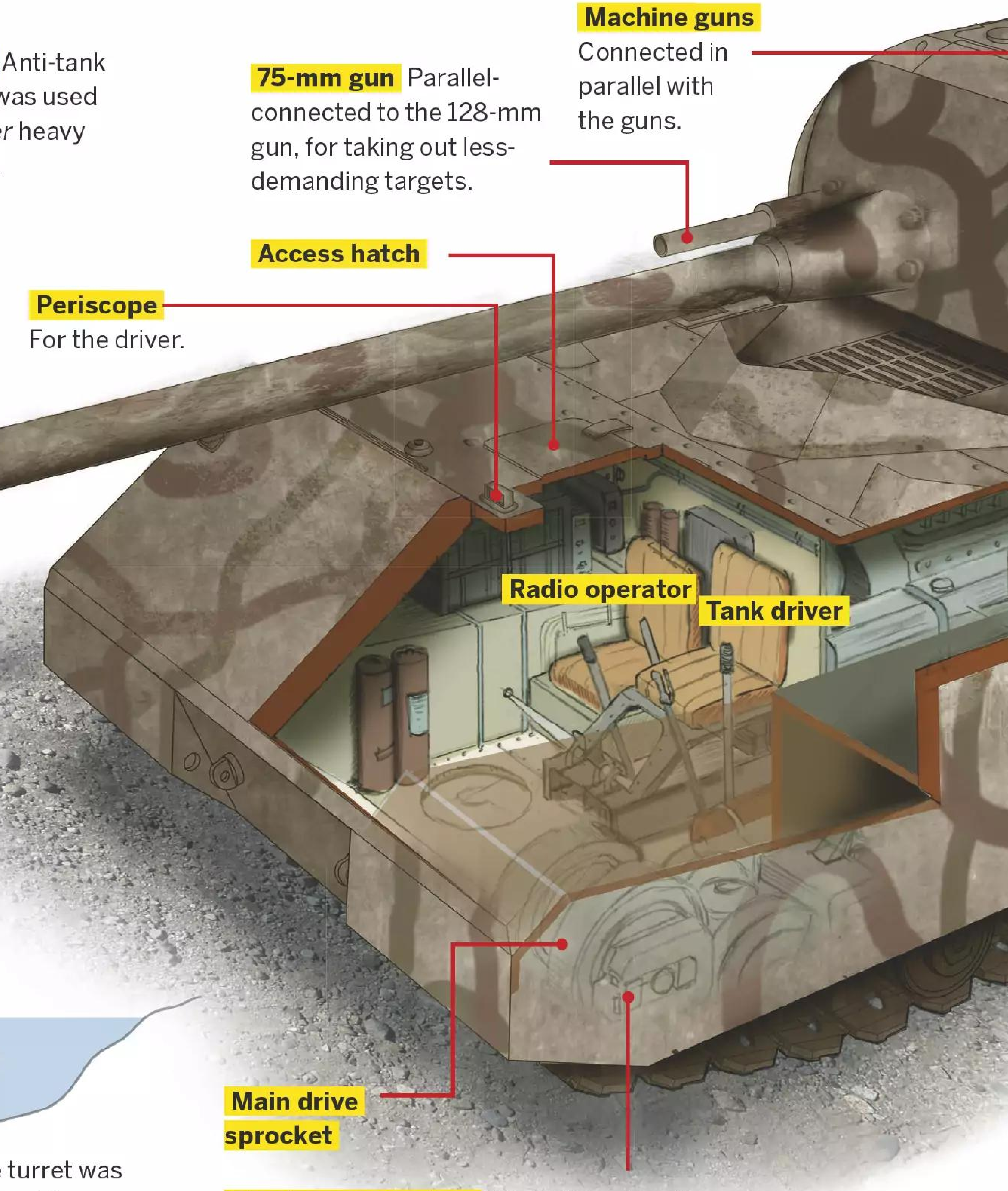
Petrol engine Not directly connected to the drive assembly via the gearbox as on conventional tanks, but instead powered a generator that provided power to two electric motors.



Underwater *Maus* was too heavy for most bridges and therefore had to 'ford deep water' (maximum eight metres). Here the turret was lowered to seal the hull and a cable connected to another *Maus* on land that gave the fording tank power. A large snorkel-like pipe provided *Maus* with fresh air while evacuating heated air.



Loader Two loaders because the heavy ammunition for the main gun was divided. Each worked independently.



Periscope For the loader.

Machine guns Connected in parallel with the guns.

128-mm gun Anti-tank gun. A variant was used on the *Jagdtiger* heavy tank destroyer.

75-mm gun Parallel-connected to the 128-mm gun, for taking out less-demanding targets.

Access hatch

Periscope For the driver.

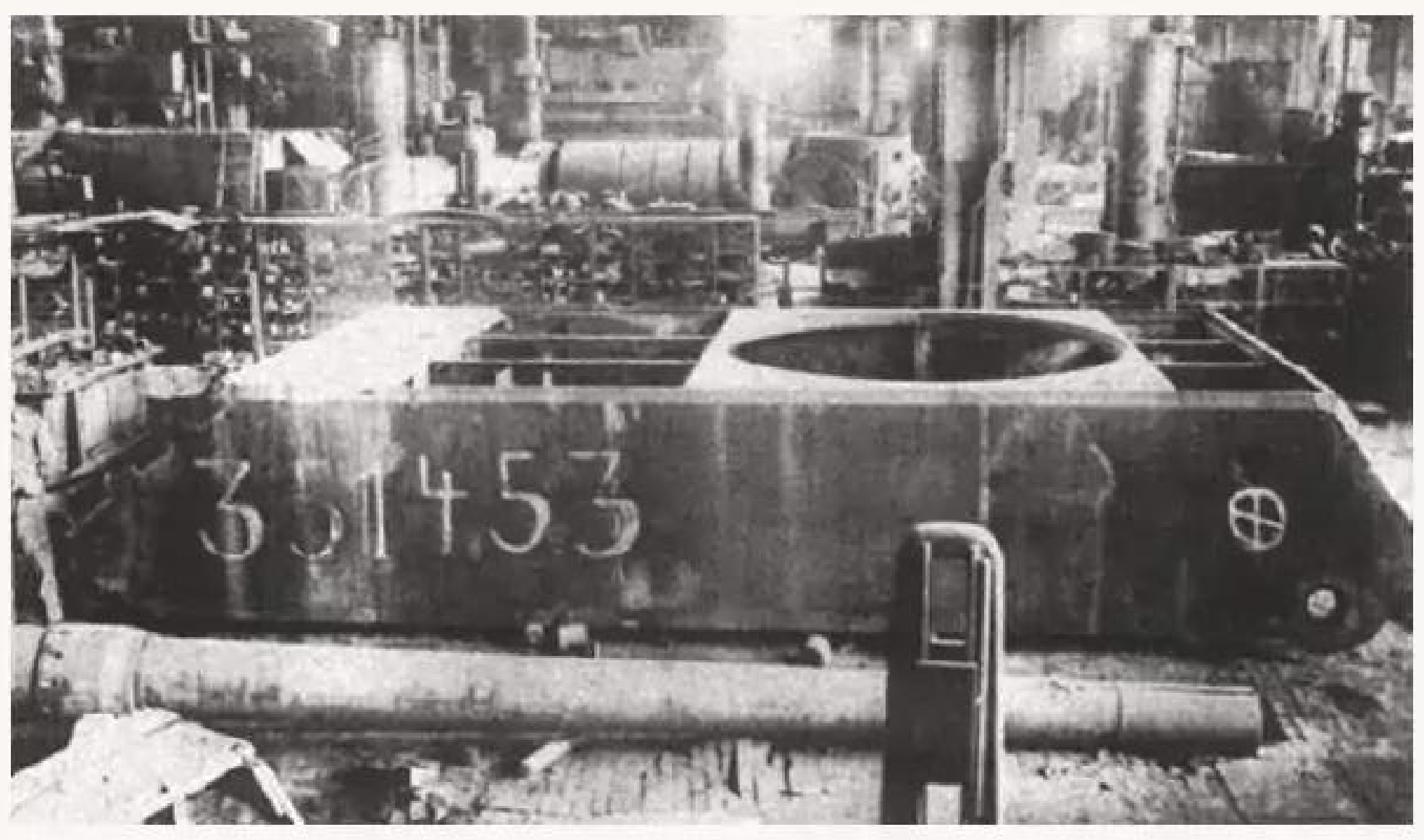
Radio operator

Tank driver

Main drive sprocket

Tension mechanism When the caterpillars began to loosen, they could be tensioned by moving the drive sprocket forward.

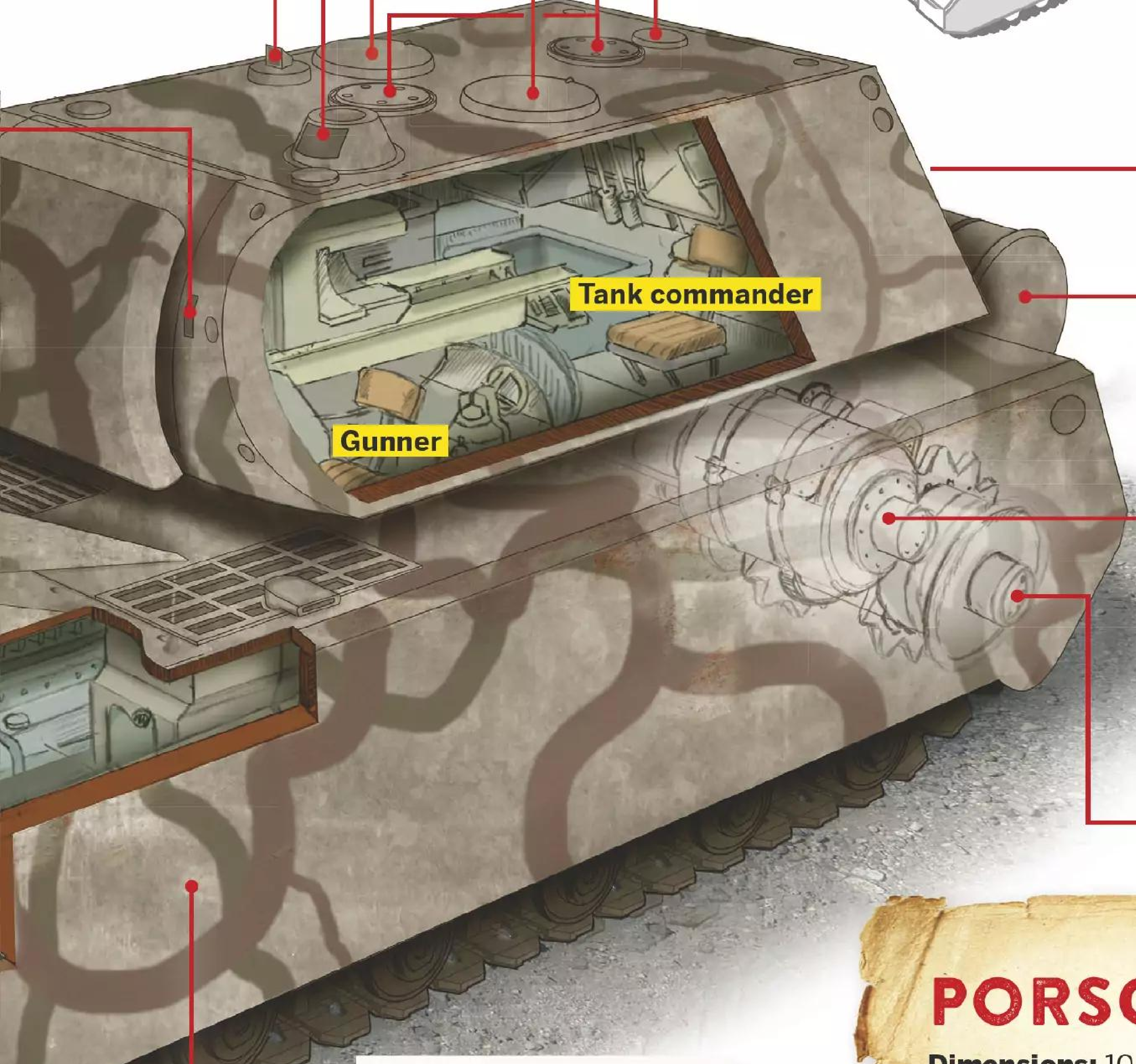
GRAPHIC: PETTER LÖNEGÅRD/ LÖNEGÅRD & CO

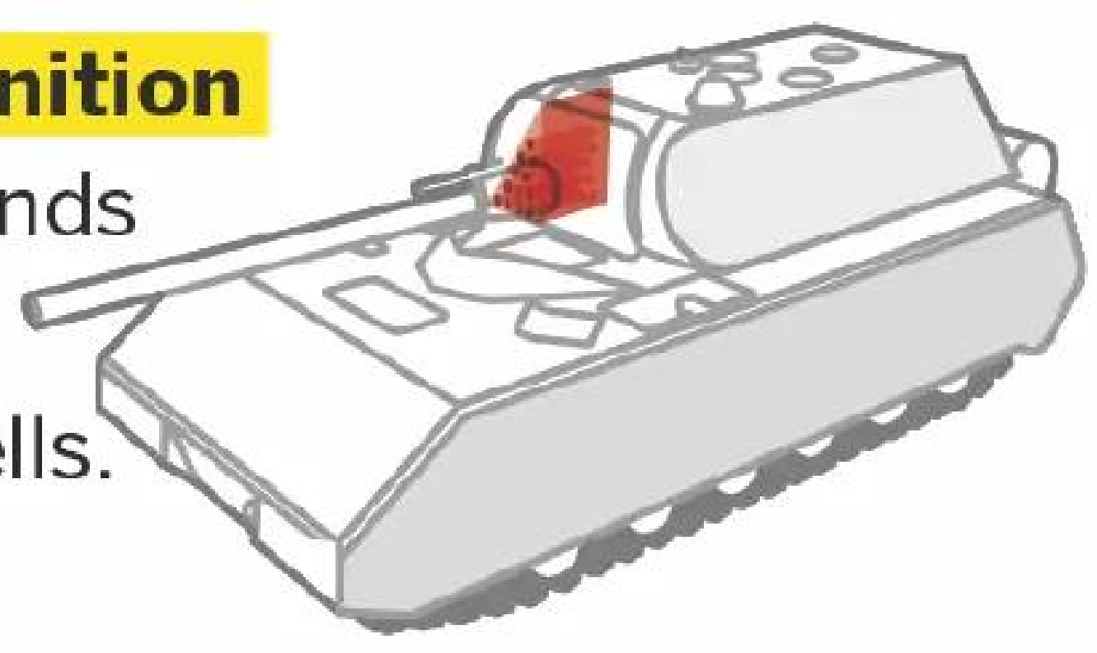


A picture from Krupp's factory in 1945 shows an incomplete Maus hull. The gun can be seen in the foreground.

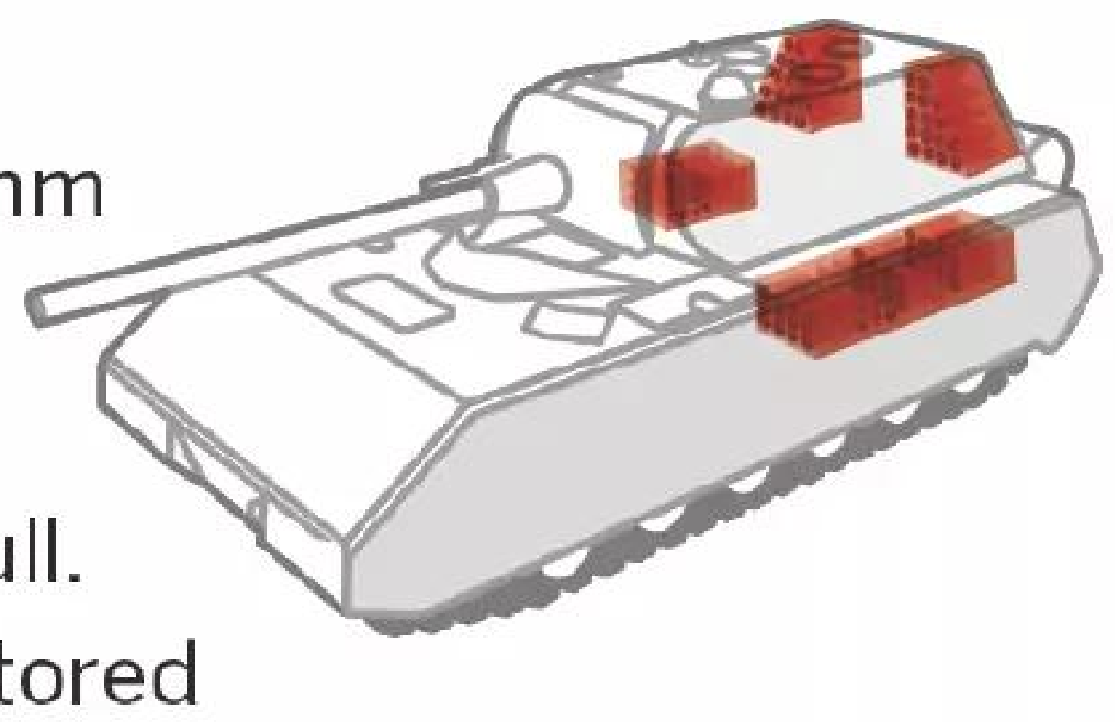
The Alkett prototype hull receives a superstructure designed to simulate the turret's size and weight.

The Russians mounted prototype two's turret on prototype one's hull. The tank is located at the museum in Kubinka.





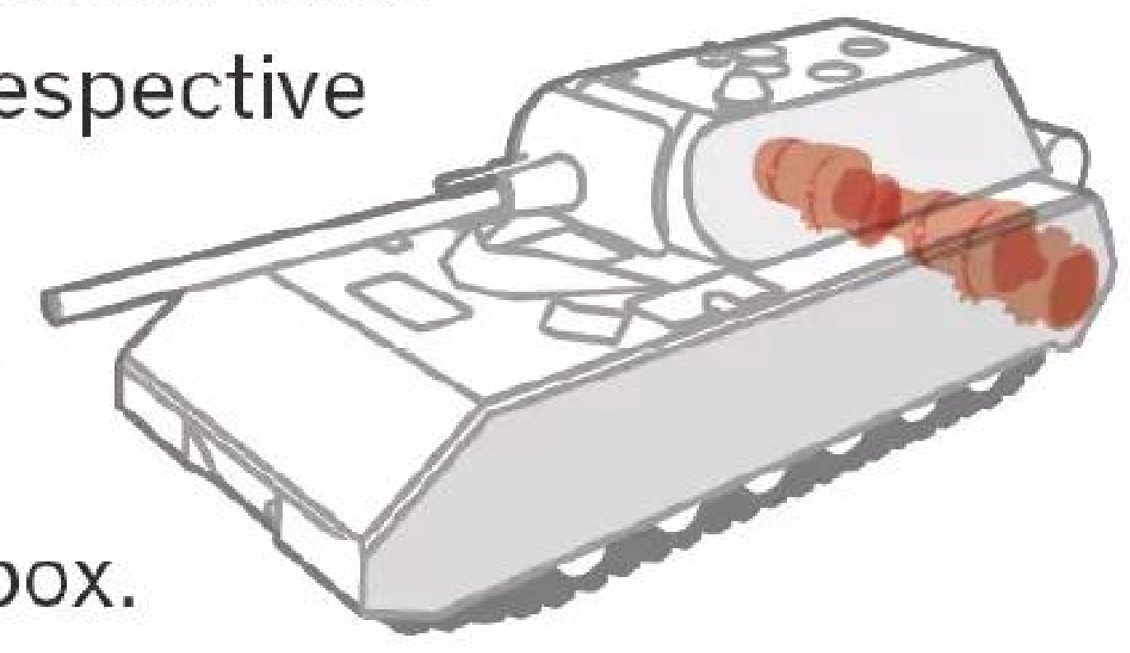
Ammunition 100 rounds of 75-mm shells.



Ammunition 68 rounds of 128-mm shells. 24 were in the turret and a further 44 in the hull. Ammunition was stored and split.

Ammunition hatch Set behind the turret where the ammunition was loaded (right).

Extra fuel tank Held 1,000 litres and was needed: fuel consumption was around 140 litres per mile when driving on roads, and 380 litres/mile when off-road.



Electric motor One on each side to power the respective drive assemblies. Two forward gears and two reverse gears, but no gearbox.

Rear drive sprocket

Side armour Fixed welded plates. Protected tank, but made changing the tracks difficult. When they needed changing, the hull was raised using a jack (above).

PORSCHE 205 MAUS

Dimensions: 10.1 x 3.7 x 3.6 m.
Battle weight: 188 tonnes.
Armour: 240-mm turret, 200-mm front chassis.
Crew: 6 men.
Obstacle clearance: 0.75 m (trench crossing 3.48 m).
Engine: 1,200 horsepower MB 509 V12 petrol engine.
Power Transmission: Generator drove two electric motors, one for each of the tank's drive assemblies.
Top speed: 20 km/h (road).
Range: 186 km road, 68 km over rough terrain.
Armament: 128-mm KwK 44 L/55, 75-mm KwK 44 L/55, 1x machine gun.
Note: A more powerful diesel engine and different arming options were in development.

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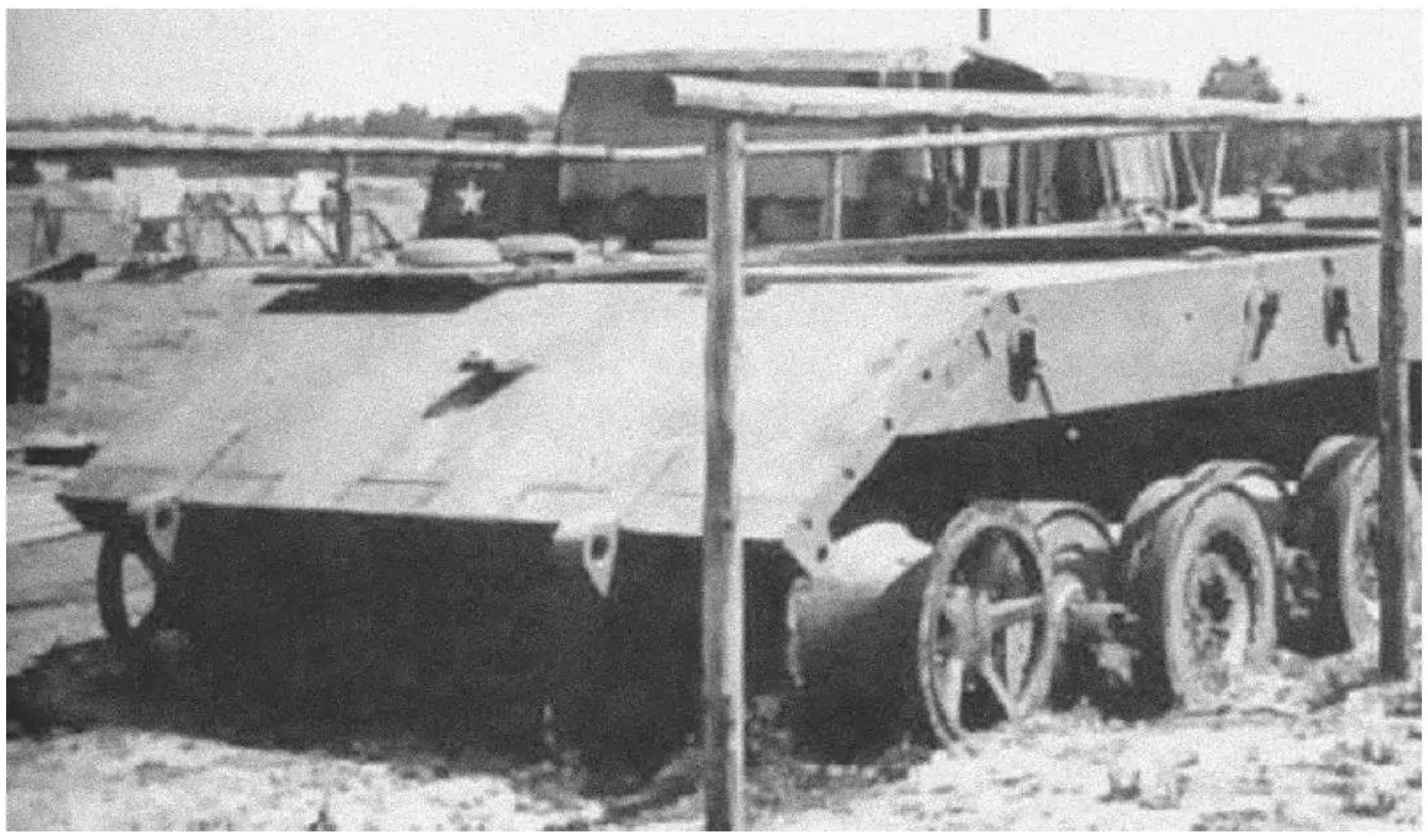
Armaments Minister Albert Speer wished to focus resources on existing weapons. Here he inspects a Panzer V 'Panther'.



British troops found a prototype hull for the German breakthrough tank E-100. The hull was designed by Krupp, but would have been fitted with Porsche's turret designed originally for the Maus.

"BOTH TYPES WOULD PROBABLY HAVE BEEN CONSIDERED... UNREALISTIC IN 1939."

around 20 tonnes. Neither can be considered a heavy tank, and in similar fashion none of Italy, Japan, the US or Britain had heavy tanks when the war arrived.

Unsurprisingly, the rapid German blitzkriegs in 1939 and 1940 did nothing to boost the development of super-heavy or breakthrough tanks. On the contrary, it demonstrated the need for rapid-terrain forces and tanks that can be referred to as medium-heavy, weighing around 20-25 tonnes. The Panzer III and IV tanks with three men in the turret (commander, gunner and loader) were easy to manoeuvre and quicker to fire than other options. This formed the main school of thought for most tank development that followed.

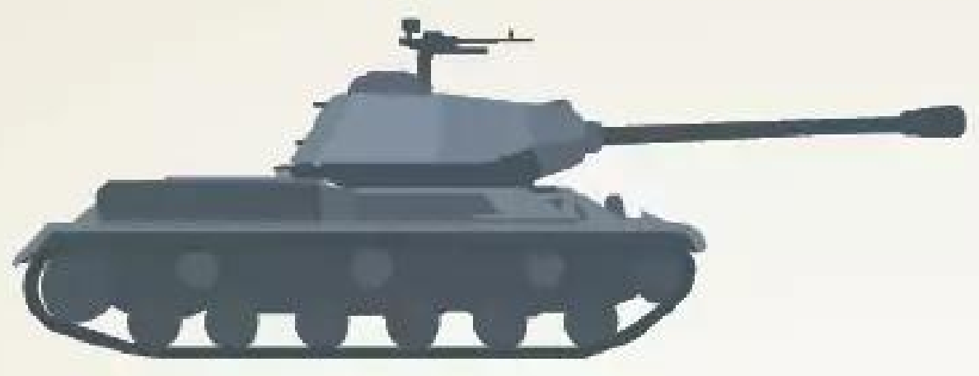
The rapid technical development during the war was driven by the need for a weapon system that was always slightly better than the enemy's (or at least not much inferior). This eventually resulted in stronger armour, better weapons and ammunition with corresponding targeting, stronger engines, better track assemblies, and so on. Tank models offering performance previously considered fanciful were eventually developed and manufactured.

NONE OF THE tanks that came into production and battle during the war can be characterised as breakthrough tanks. A few can be classified as heavy or super-heavy main tanks with a weight close to 50 tonnes or more. Examples include the Soviet JS-II (46 tonnes) and German *Königstiger* (Tiger II, 68 tonnes). Both types would probably have been considered completely unrealistic if someone had proposed them in 1939.

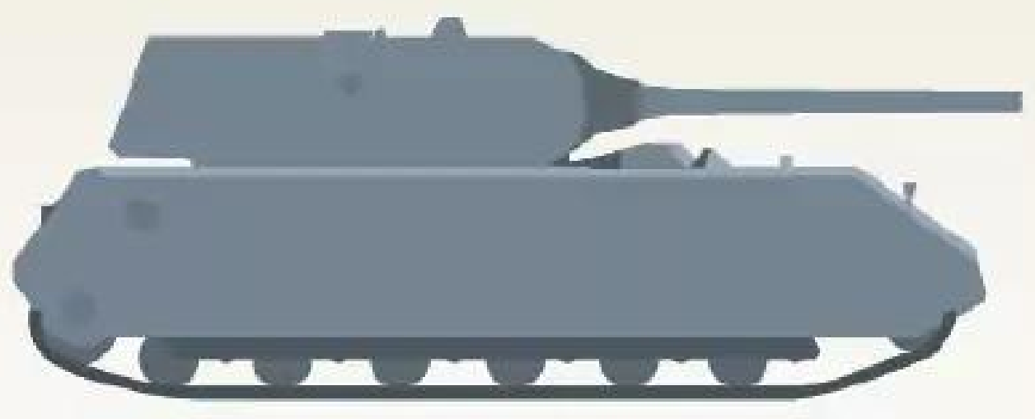
THE DEVELOPMENT OF new tanks during the war followed essentially two main lines.

In the US, Soviet Union and, to some extent, in the UK, priority was given to standardisation and production volumes. Desires for improvements and suggestions for new models were carefully reviewed. The possible benefits of a new model were weighed against the costs and how a new tank would affect the production of existing models. The authorities in charge of new materiel and arms were the ones in control. Industry and politicians played

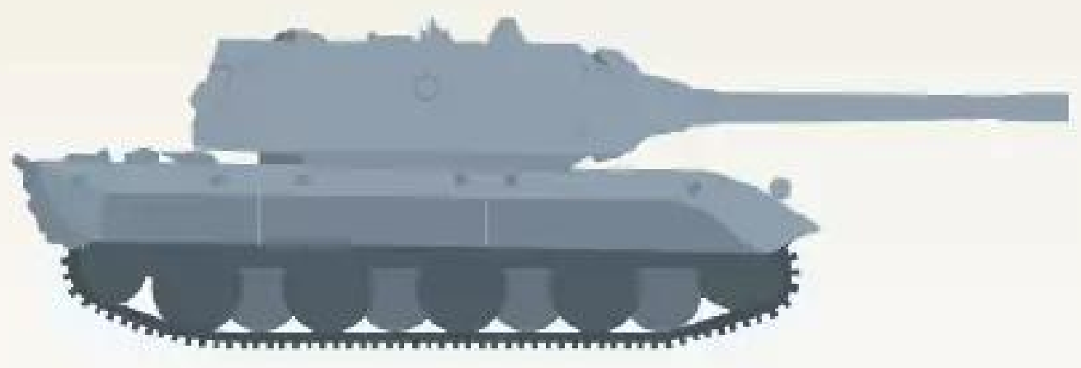
Ferdinand Porsche designed the Maus.



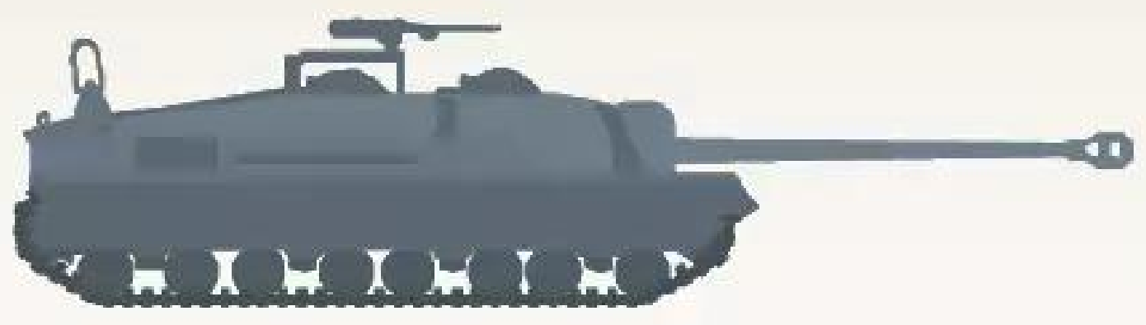
JS-2
Launched: 1943. **Weight:** 46 t.
Armament: 1x 122-mm L/48 gun, 3x machine guns.
Numbers: around 2,350.
Active: 1944–56.



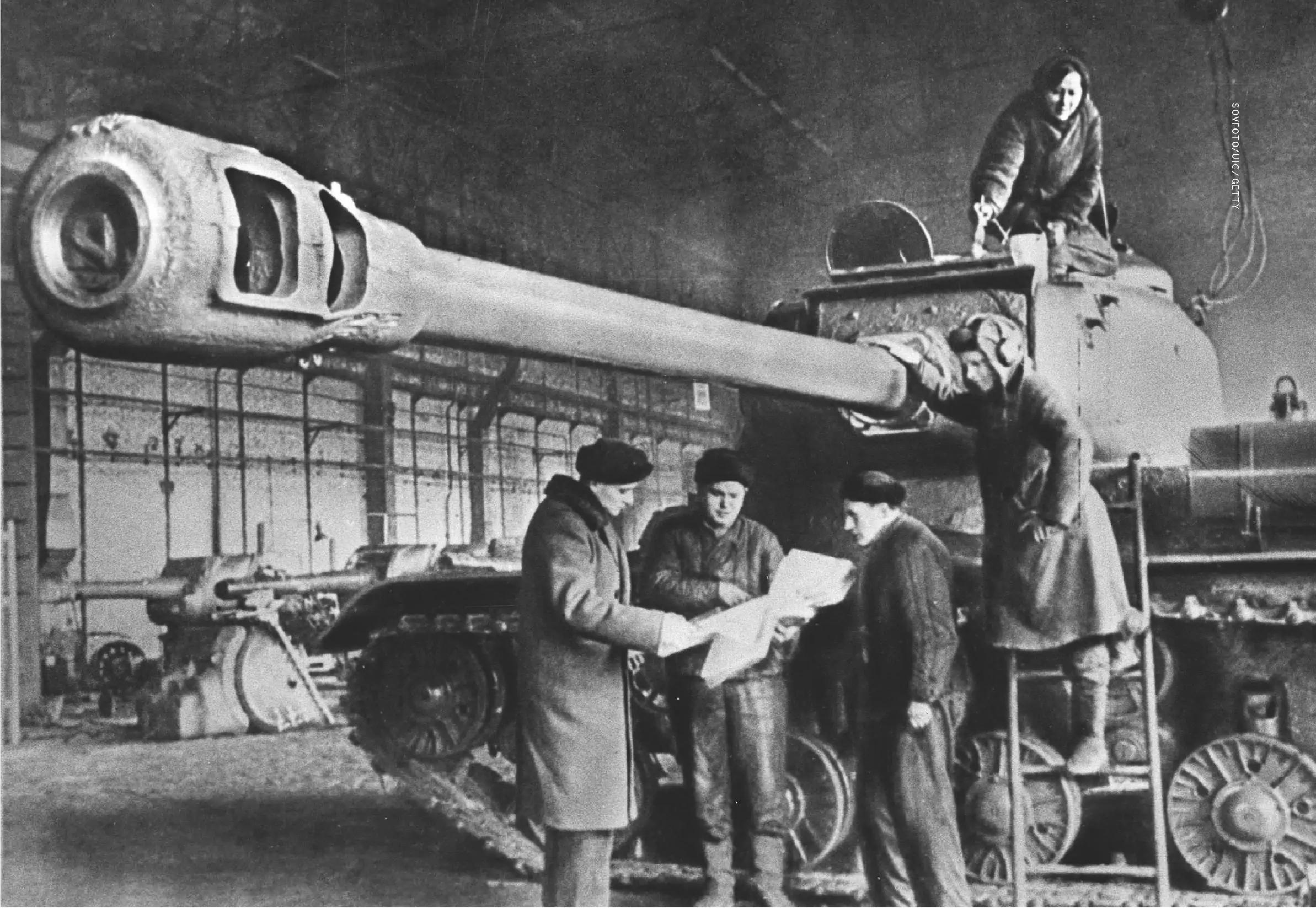
Maus
Launched: 1944. **Weight:** 188 t.
Armament: 1x 128-mm gun, 1x 75-mm gun, 2x machine guns.
Numbers: 2 prototypes.
Active: n/a.



E-100
Launch: unclear. **Weight:** 140 t.
Armament: 1x 128 or 150-mm gun, 1x 75-mm gun, 1x machine gun.
Numbers: 1 prototype hull, 1944.
Active: n/a.



T28
Launched: 1945. **Weight:** 86 t.
Armament: 1x 76-mm gun, 1x machine gun.
Numbers: 2 prototypes.
Active: n/a.

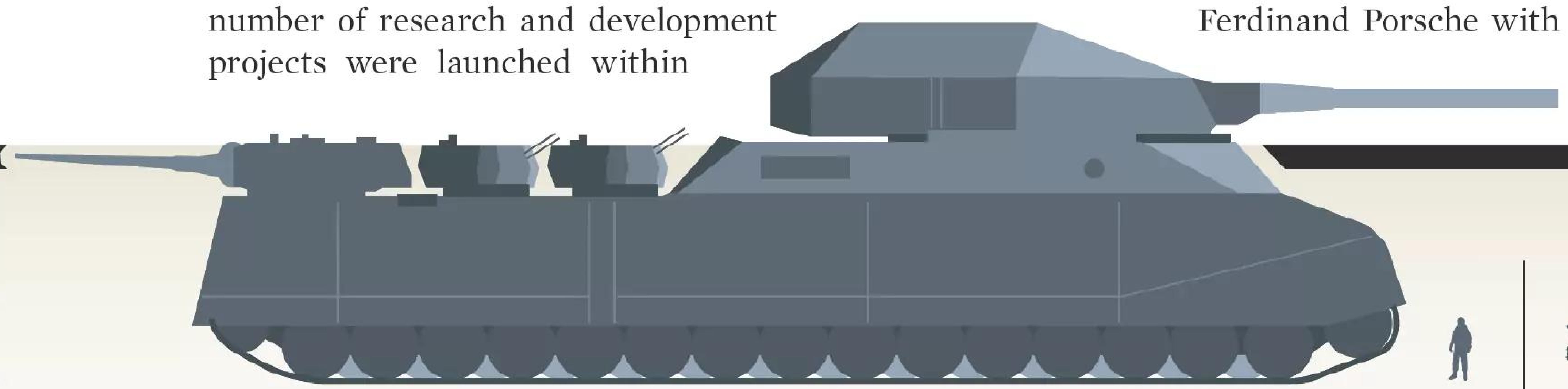

SOVFOTO/UIG/GETTY

A JS-2 emerges from the tank factory. Note that the 122-mm gun had a hydro-pneumatic recoil.

a minor role in the development of new tanks. It didn't mean there were no thoughts and projects for the development of breakthrough and super-heavy tanks. But very few made it as far as the prototype stage, never mind the production line.

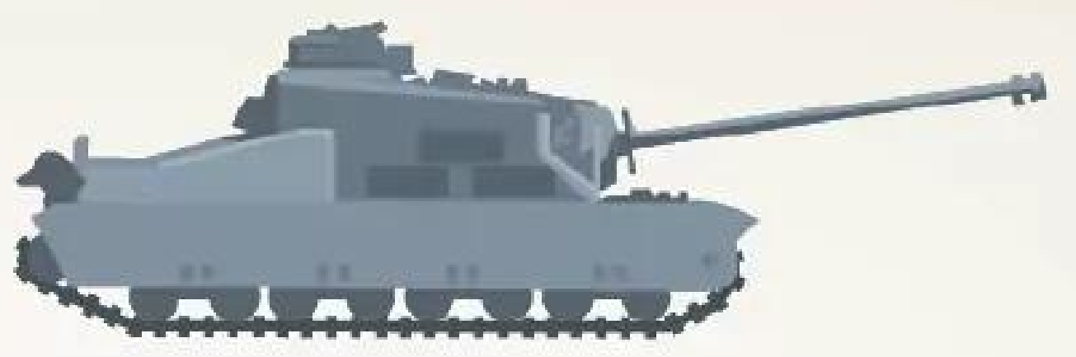
GERMANY CHOSE ANOTHER path and looked to develop superior tanks that could outweigh their inferior numbers. Within this framework – and combined with the way Hitler and other power brokers intervened in development projects – a huge number of research and development projects were launched within all conceivable areas. Direct contact between industry leaders and those in power helped business bypass the process of developing and producing the materiel the armed forces needed in a rational way through the *Heereswaffenamt* (HWA, or German Army Weapons Agency).

HITLER AGREED THAT two rival companies could develop important war equipment such as the super-heavy Panzer VIII tank that came under the name of *Maus* ('Mouse'). He tasked Ferdinand Porsche with starting



Landkreutzer P.1000 Ratte

Launched: 1942.
Weight: at least 1,000 t.
Armament: 2x 280-mm gun, 1x 128-mm gun, 8x 20-mm Flak38 guns, 2x machine guns.
Numbers: the proposal to build this *landkreuzer* ('land cruiser') came from Krupp in June 1942. The company received the formal go-ahead to build *Ratte* (Rat) in December. Minister of Armaments Albert Speer cancelled the project in 1943 while it was still in its infancy. No prototype was built.
Active: n/a.



A39 Tortoise

Launched: 1946. **Weight:** 79 t.
Armament: 1x 94-mm gun, 3x machine guns.
Numbers: 6 prototypes.
Active: n/a.

▶ development of a super-heavy tank during a meeting at the Reich Chancellery in November 1941. In February 1942, Krupp received an order for a 72-tonne tank, which was subsequently withdrawn in March when both Porsche and Krupp were commissioned instead to develop an even heavier tank weighing 100 tonnes.

Newly appointed Minister of Armaments Albert Speer responded to this approach of allowing companies to pitch directly to political leaders by getting Hitler to approve a regulation prohibiting this behaviour in May 1942. In this way he stymied future development in favour of improving production of existing tanks.

Nevertheless, tests of prototype heavy tanks were still scheduled to take place before the spring of 1943 where Hitler saw the need for a 100-tonne tank and specifically the Tiger II to meet the new Soviet tanks he expected to be in service in 1944.

IN JUNE HITLER approved the drawings, aware the tank would almost be a mobile bunker with low speeds. They envisaged the *Maus* would be protected by following other tanks to prevent enemy tanks, anti-tank weapons and infantry battling the super-heavy tank in unfavourable conditions.

In January 1943, Hitler chose Porsche's prototype as the one to put into production. Despite losing out, Krupp was still given a contract to deliver the hull and turret. Production was scheduled to begin in late 1943 with a production rate of 10 tanks per month. Assembling the first hull began in September, but in October the order for the tanks was cancelled. All resources needed to focus on manufacturing tanks that were already in production. Despite this, a further hull and turret were produced for testing purposes, which were conducted until mid-November 1944 when the order to terminate all work on the *Maus* was issued.

"THE SPECIFIC VISION OF A BREAKTHROUGH TANK SHOULD PROBABLY BE CONSIDERED DEAD."

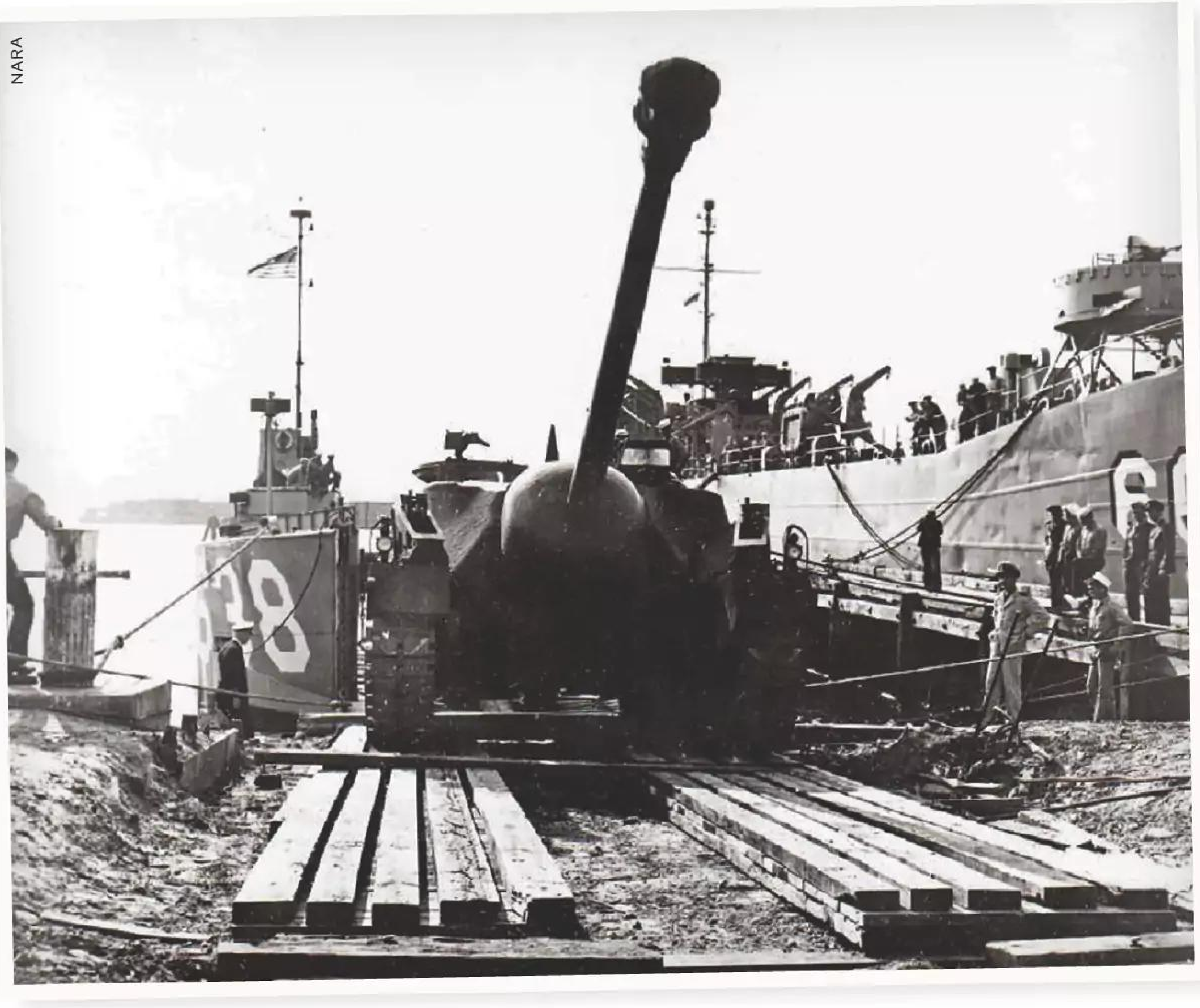
During the war, Germany carried out several other projects – both realistic and fanciful – aimed at developing super-heavy and breakthrough tanks. Apart from the Tiger II, however, no projects got as far as the *Maus*.

ON THE ALLIED side, there were only two projects for so-called breakthrough tanks that went into limited production – and only then after the war's end in 1945. Both models lacked a turret and can almost be regarded as super-heavy artillery vehicles rather than actual tanks.

One was the American T-28. The Ordnance Department (US equivalent of the German HWA) saw the need for a specialist assault tank that could break through defensive fortifications after the Allies crossed into Europe. Design work began in September 1943 and construction was approved in March 1944. The turretless T-28 was equipped with a 105-mm gun and weighed 86 tonnes. An order for five prototypes followed in March 1945, but this was reduced to two at the end of the war, of which the first was delivered in December 1945.

The British also saw the need for a breakthrough tank to take on fortified

An American T-28 runs ashore at Suncheon in the Korean War on 2nd October, 1950. There is no evidence that this self-propelled gun ever came into conflict.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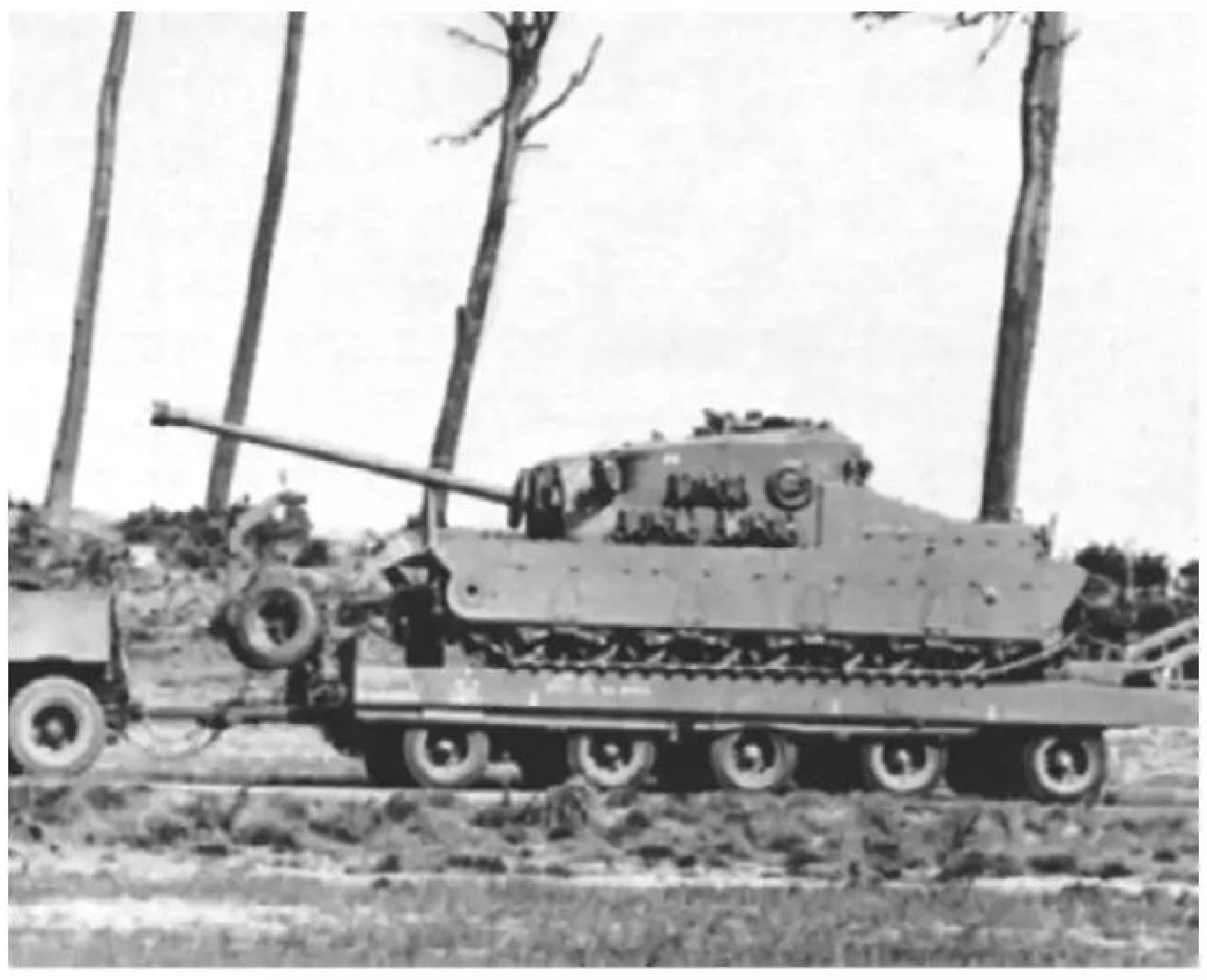
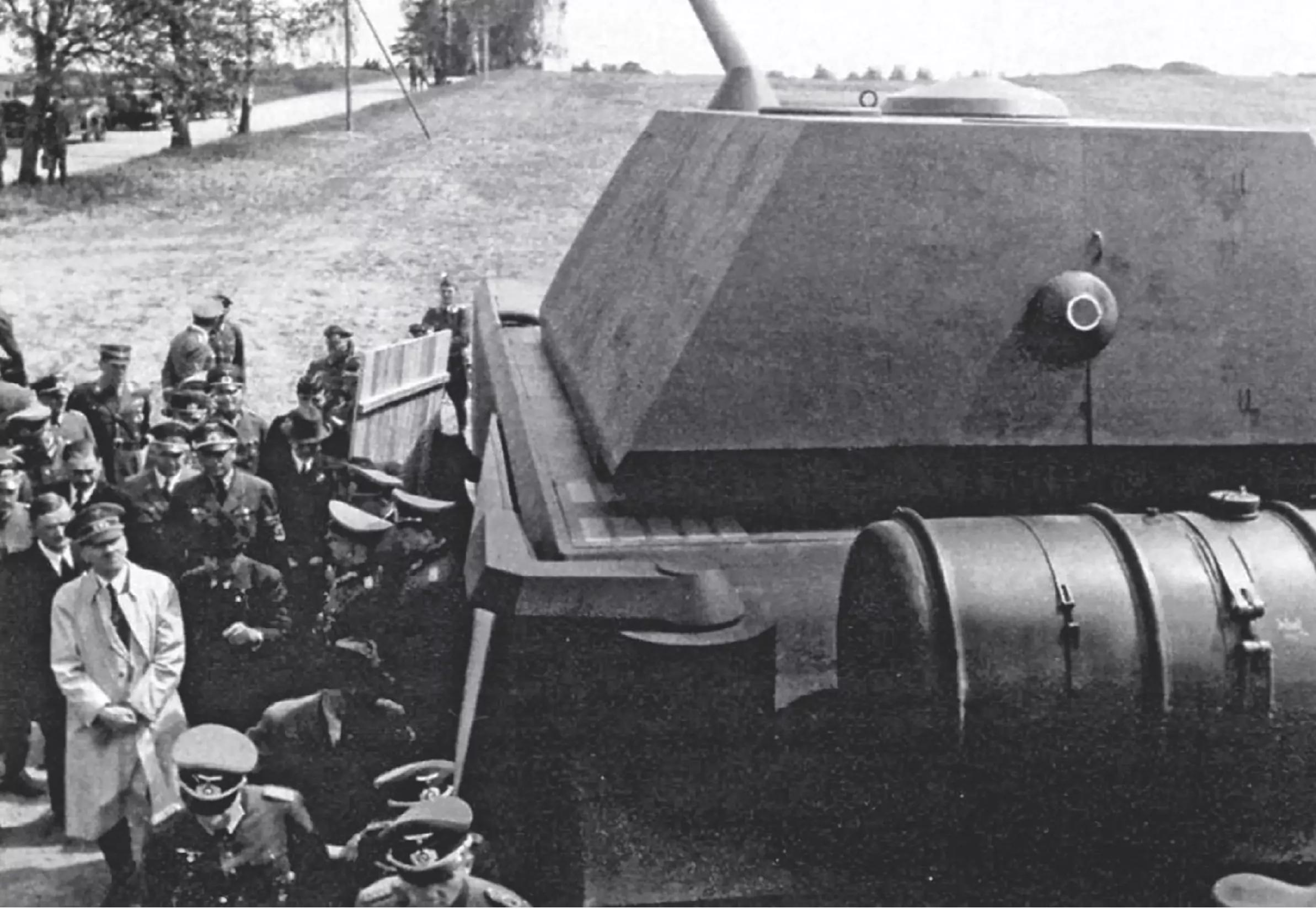


The British A39 Tortoise is towed on a trailer during tests in Germany in 1948.



Hitler decided that Porsche would be given the task of designing the new super-heavy tank. This full-scale wooden model of Maus was shown on 1st May, 1943.

positions after landing in France. In March 1943 the challenge was presented to industrial firms. The Nuffield Group devised and presented several proposals, and in the spring of 1944 an order for 25 A39 Tortoise heavy assault tanks were placed. The vehicles were expected to be operational by September 1945.

The tank weighed 78 tonnes and was armed with a 93-mm gun. The war's end meant the order was reduced to just six models with deliveries starting in 1946.

DURING WORLD WAR II, Germany provided a supportive environment where creative industrialists had direct access to decision makers at the top echelons of power. They had a strong basis on which to create and run projects aimed at developing super-heavy and breakthrough tanks over the heads of those who should have been responsible – the HWA.

This splitting of resources that led to a wide variety of combat vehicles being developed and put into production must be compared to the Soviet and US focus on standardisation and large production volumes. It was only when Albert Speer was appointed Minister of Armaments in the spring of 1942 that German development eventually began to come under some form of control.

THE DREAM OF developing the ultimate tank – superior to all enemies – is still alive today, but it's unlikely to lead to super-heavy tanks. Instead, superiority is achieved through a combination of tried-and-tested techniques along with technological innovation. Superiority on the battlefield is ultimately the result of combining weaponry and soldiers as part of a system where ability is spread through a number of different areas – including logistics, intelligence and air defence – and then discovering how to use them all optimally to determine the outcome.

On the other hand, the specific vision of a breakthrough tank that can easily penetrate even the most formidable defensive lines should probably be considered dead. ✠

Harald Sonesson is a reserve officer with a background in the tank service.

Further reading: **Super-heavy Tanks of World War II** by Kenneth W Estes, 2014 Osprey Publishing ⋆ **Special Panzer Variants** by Walter J Spielberger, 2012 Schiffer Publishing

PHOTOGRAPHS

COVER

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WELCOME

P. 3: PhotoQuest/Getty

CONTENTS

P. 4-5: AP/Polfoto

AFRIKA KORPS SAVED ITALIANS

P. 26-27: AP/Polfoto, p. 28: www.od43.com, p. 28-29: AP/Polfoto, p. 29: Australian War Memorial 009517/Wikimedia, Imperial War Museum TR 2733/Wikimedia, p. 30: Raffaele Ruggeri/Osprey, Wikimedia, militaria-net.co.uk, quanonline.com, p. 31: BArch Bundesarchiv Bild 101-783-0140-38/Wikimedia, BArch Bundesarchiv Bild 101-783-1040-09, p. 32: BArch Bundesarchiv Bild 101-432-0760-10, p. 33: www.ioffer.com, Imperial War Museum MH 5588/Wikimedia.

NOVICE FORGED AHEAD ON THE BATTLEFIELD

P. 58-59: Corbis/Getty Images, p. 60: Pinterest, Dropzone Supplies, IWM/Getty Images, p. 61: Keystone/Getty Images, Corbis/Getty Images, Mirrorpix/Getty Images, p. 62: Heinrich Hoffmann/LIFE/Getty Images, p. 63: Popperfoto/Getty Images, www.german.05m6.de, eBay, p. 64: acepilotp.com, Pinterest, p. 65: Osprey, p. 66: George Rodger/Getty Images, akg/Scanpix, p. 67: Popperfoto/Getty Images, Wikimedia

THE GREAT DECEPTION

P. 98-99: Roger Viollet/Polfoto, P 100: Wikimedia, www.mediad.publicbroadcasting.net/shared/npr/201207/156190012.jpg, Corbis/Polfoto, p. 101: Corbis/Polfoto, Bridgeman/Scanpix, Bridgeman/Scanpix, Getty Images, Bridgeman/Scanpix, p. 102: Imperial War Museum (NA 14415, H42527, H 42535), p. 103: Imperial War Museum (H442530), The National Archives, London, The National Archives, London, p. 104: Ullstein Photo, Getty Images, p. 105: Shutterstock, Bletchley Trust, Tamara Kreisler, www.americainwwii.com, Wikimedia, Tamara Kreisler, Wikimedia, p. 106: gozmodo.com, www.photostab.ru, Dorling Kindersley Images, bicyclecards.com, International Spy Museum, Wikimedia, p. 107, Imperial War Museum (HU 66759), Wikimedia.

THE DAYS AFTER

P. 112-113: Hulton Archive/Getty Images, p. 114: Wikimedia, www.worldwar2aces.com, Desert Rats Association, p. 114-115: Polfoto, p. 115: Shutterstock, p. 116: Gerry Images, Osprey Publishing, p. 117: Ullstein/Polfoto, Osprey Publishing, p. 118: US Army/Wikimedia, Getty Images, Wikimedia/US Army, p. 119: National Archive USA/Wikimedia, Getty Images, National Archive USA/Wikimedia, Bundesarchiv (Bild 101i-494-3376-20A), Bill Shea/www.therupturedduck.com, Flickr.

THE TIGER IS ITS OWN WORST ENEMY

P. 136-137: Ullstein/Polfoto, p. 138-139: albumwar2.com, p. 139: Süddeutsche Zeitung Photo/Scanpix, Heinrich offmann/Ullstein/Polfoto, p. 140-141: SV-Bilderdienst/Ullstein/Polfoto, p. 142: www.darkroastedblend.com, Shutterstock, p. 142-143: Osprey, p. 143: Süddeutsche Zeitung Photo/Ullstein/Polfoto, Ullstein/Polfoto, p. 144: www.johnnyg.westhost.com, www.warrelics.eu, p. 144-145: Heinrich Hoffmann/Ullstein/Polfoto, p. 146: akg/Scanpix, BArch Bundesarchiv 146-1972-064-61/Wikimedia, p. 147: www.militarytour.com, Ullstein/Polfoto, Topfoto/Polfoto.

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TANKS!

BATTLEFIELD MONSTERS

Tanks underwent revolutionary change during World War II. Thicker armour and more powerful weapons saw tactics change as new opportunities for tank warfare presented themselves. In open countryside, tanks were vulnerable, but a skilled tank commander could – in close concert with his crew – manoeuvre his weapon to lethal effect. Tanks came to pay a decisive role in many battles – not least on the Eastern Front. Meet the WWII tank aces and follow the dramatic skirmishes between these battlefield titans.

EASTERN FRONT, 1943

THE MYTH OF KURSK

Dubbed "the world's greatest tank battle", the Battle of Kursk in July 1943 was no more extensive than many other battles on the Eastern Front, but myths still abound about what actually happened during Germany's last offensive in the Soviet Union.

Text: RASMUS KJÆRBYE PETERSEN

THE GREAT DECEPTION

When German spy planes flew over southern England in the spring of 1944, the pilots witnessed a terrifying sight. Where before the landscape had lain deserted, the Allies were now building a vast army. Tanks and planes were ready to attack, while training camps buzzed with hundreds and thousands of men, but the scene was just a giant ruse to mislead the Nazis ahead of the Normandy landings. The deception also involved an army of double agents – among them, the cunning Juan Pujol García, who decided to reveal the invasion plans the night before D-Day.

NORTH AFRICA, 1941

SOVIET UNION, 1943

TANK

Tiger was a born killer

The German company Henschel & Sohn produced 1,347 Tiger I tanks. They were all equipped with the most advanced technology that Nazi Germany could provide.

EASY TO ROTATE

FACTS

- **The hydraulic steering system** meant that the caterpillar tracks could drive each way, and the Tiger could turn on its axis in just 3.44 metres.
- **Top speed** was 45.4 kilometres per hour and about half that in uneven terrain. The Soviet T-34 and the American Sherman were only slightly faster. The Tiger's top speed was later reduced to 38 kilometres per hour to prevent overloading the engines and gears.

The snorkel and watertight hull allowed the Tiger to ford rivers 4.5 metres deep. Only the first 495 Tigers were equipped with snorkels.

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